2019

THE INFLUENCES OF EARLY MOTHER-CHILD ATTACHMENT ND TEACHER-CHILD RELATIONSHIPS ON CHILDREN'S EMOTION REGULATION IN THIRD GRADE

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A Dissertation Submitted to the

Graduate School

In Partial Fulfillment of the

Requirements for the Degree of

DOCTOR OF EDUCATION

Benerd School of Education
Curriculum and Instruction

University of the Pacific
Stockton, California

2019

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ACKNOWLEDGEMENTS

After years of struggling, I finally reached the end of this dissertation journey. My sincere gratitude goes to all the members of my dissertation committee for their years of support, guidance and encouragement. I am grateful to Dr. Linda Webster, my committee chair for her insightful guidance, continuous encouragement and kindness to me. I am grateful to Dr. Justin Low for helping me solving all the problems of statistical analyses. I am also grateful to Dr. Rachelle Kisst Hackett for her warm encouragement and constant support. Lastly, I would like to thank Dr. Elizabeth Betsy Keithcart and my colleagues for their support in completing this journey.

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Abstract

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2019

Attachment theory states that emotion regulation is one of the central features of attachment system. The current study adopted an attachment perspective to investigate how mother-child attachment at 36 months and teacher-child relationships at 54 months influence children's emotion regulation in 3rd grade, and whether teacher-child relationships moderate the associations between mother-child attachment and children's emotion regulation. Longitudinal data from the first three phases of the National Institute of Child Health and Human development Early Child Care Research Network of Study of Early Child Care and Youth Development (NICHD SECCYD) were used in the study.

The results showed that the association of teacher-child conflict and child's negative engagement with peers was statistically significant. Additionally, teacher-child relationships significantly moderated the impacts of mother-child attachment on children's emotion regulation. Specifically, the relationship between teacher-child conflict and negative engagement with peers for children with secure attachment and for those with disorganized attachment were in opposite directions. The relationship between teacher-child closeness and negative engagement with peers was significant for children with disorganized

attachment, but not for children with secure attachment. And, the results showed that the levels of conflict in teacher-child relationships for children with ambivalent and with disorganized attachment were statistically different from those for children with secure attachment. The present study fills in the research gap with regard to the effects of teacher-child relationships on children's emotion regulation. It also suggests that children's experiences of positive teacher-child relationships may compensate for the negative impacts of insecure early mother-child attachment patterns on emotion regulation development.

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CHAPTER 1: INTRODUCTION

Background

In the last decades, the topic of emotion regulation has garnered ever more extensive attention from researchers in psychology (e.g., Cole, Martin, & Dennis, 2004; Denham, 1998; Eisenberg & Spinrad, 2004; Gross, 2014; Mikulincer & Shaver, 2019). Emotion regulation together with emotion awareness, understanding and expression are regarded as the core aspects of emotion competence, which influences the ability of an individual to function adaptively in many contexts, such as in schools (Halberstadt, Dunsmore, & Denham, 2001; Saarni, 1999). Emotion regulation generally involves individuals changing their emotional state in terms of physiology, experience and expressed behavior, through some strategies and mechanisms to reach goals or situational demands (Cole et al., 2004; Eisenberg & Spinrad, 2004). However, emotion dysregulation is related with the following indices: "(1) emotions endure and regulatory attempts are ineffective, (2) emotions interfere with appropriate behavior, (3) emotions that are expressed or experienced are context inappropriate, and (4) emotions either change too abruptly or too slowly" (Roll Koglin, & Petermann, 2012, p.910). Although emotion regulation develops throughout an individuals' life span, the early years are particularly important as they lay the neurobiological foundation for subsequent adaptation (Schore, 2001, 2005).

Research shows that emotion regulation has great impact on children's later development, such as socialization, school performance and emotional problems (Eisenberg, Sadovsky &Spinrad, 2005; Garnefski, Rieffe, Jellesma, Hannesdottir & Ollendick, 2007). It

has been found that there are significant associations between children's emotion regulation and their peer status, relationship quality, prosocial behavior, and social competence (Roll, Koglin, & Petermann, 2012). Adaptive emotion regulation strategies are essential for successful school functioning (Calkins, 1994) and have been positively associated with children's academic outcomes (Li-Grining, Votruba-Drzal, Maldonado-Carreno, & Haas, 2010). The converse of strong emotion regulation skills is reactive, less adaptive regulation strategies (Eisenburg, Spinrad & Morris, 2002), which are less effective for successful management of daily activities. Emotion dysregulation has been linked with many forms of psychopathology (Gross & Thompson, 2007), including anxiety disorders (Campbell-Sills, Ellard & Barlow, 2014), major depression, bipolar disorder (Joormann & Siemer, 2014), and attention deficit hyperactivity disorder (ADHD).

Problem Statement

In the first two years after birth, children mainly rely on their parents to regulate emotions (Morris, Silk, Steinberg, Myers & Robinson, 2007). Thus, the parents' support and emotional availability greatly influence the development of adaptive emotion regulation in a child (Bowlby, 1973). The Internal Working Models (IWMs) which are formed through the repetitive interactions between children and their primary caregivers, enable children to transfer earlier emotional interaction patterns to autonomous self-regulation (Zimmermann, Maier, Winter & Grossmann, 2001), and serve as relational schemas influencing the formation of their later social relationships (Davis, 2003). Although there are relatively fewer studies investigating the association between early mother-child attachment and child's emotion regulation beyond early childhood, there is some evidence supporting this

association (Contreras, Kerns, Weimer, Gentzler, & Tomich, 2000; Gilliom, Shaw, Beck, Schonberg, &Lukon, 2002; Kerns, Abraham, Schlegelmilch, & Morgan, 2007; Panfile & Laible, 2012). More specifically, children classified with secure attachment showed higher ability of regulating emotions in later middle childhood (Kerns, et al., 2007), and more effective use of regulatory strategy (Gilliom, et al., 2002).

Denham, Bassett and Zinsser (2012) argued that children's early relationships with both parents and teachers have great impacts on their emotion competence development, but few studies have been conducted to explore teachers' roles. Teacher-child relationships have been shown to have great influences on children's development (Pianta, Nimetz, & Bennett, 1997). From an attachment perspective, the teacher-child relationships can be considered as the continuation of the parent-child relationship, which reflects the emotional bond between teacher and child (Davis, 2003; Verschueren & Koomen, 2012). This relationship is rather influential in the process of children's emotion regulation, by helping them to gain the ability of labeling, managing, and expressing emotions appropriately (Pianta, 1999). In addition, Hughes, Cavell and Jackson (1999) found that positive teacher-student relationships may compensate for children's negative experience with their parents. Although there are few studies directly assessing the impact of early teacher-child relationships on children's emotion regulation in middle childhood, many researchers suggested that the relationships with a teacher may predict children's emotion regulation (Birch & Ladd, 1997; Burchinal, Peisner-Feinberg, O'Connor & McCartney, 2007; Pianta, 1994; Pianta & Stuhlman, 2004). It was claimed that children may form different relational schemas for different caregivers that they attach to (Davis, 2003; Levy, Blatt, & Shaver,

1998). Therefore, positive teacher-child relationships may provide children with insecure attachment experiences a new opportunity to experience emotional security (Davis, 2003).

Previous research provides some evidence of the linkages between early attachment and later emotion regulation (Gilliom, et al., 2002; Kerns, et al., 2007; Moutsiana, et al., 2014). However, the mechanisms underlying these linkages remain unclear, which are worthy of investigation to further understand these associations (Thompson, 2008). It has been suggested that teacher-child relationships may moderate the effects of early mother-child attachment on children's later emotion development (e.g. Davis, 2003; Birch & Ladd, 1997; O'Connor & McCartney, 2007; Pianta & Stuhlman, 2004). However, little longitudinal research has been carried out to investigate this moderation effect of teacher-child relationships.

Theoretical Framework

Attachment Theory

Bowlby (1969, 1973) stated that children form an attachment relationship with their primary caregivers in the first two years of their life. The quality of the care provided by their primary caregivers determines the quality of this relationship. This attachment relationship and the representation of it have great impacts on children's later development of interpersonal relationships, emotional and behavioral self-regulation, and self-esteem. If primary caregivers were constantly responsive and sensitive to children's needs, children then would form a secure attachment relationship with them. The secure attachment relationship serves as a secure base for children's explorative behaviors, by providing comfort and a sense of security (Bowlby, 1969, 1973).

Bowlby (1969) used 'internal working models' (IWMs) as an explanatory mechanism for how attachment influences children's development. According to attachment theory, children are thought to develop internal working models of the primary caregiver, the self and the interpersonal interactions through their early experiences with caregivers, which are especially significant for children's development (Bowlby, 1973). These internal working models unconsciously influence how children interact with others in their close relationships (Bretherton, Ridgeway, & Cassidy, 1990). The development of children's internal working models is based on the parents' overall level of sensitivity to the child's needs and desires, and physical and psychological availability (Speltz, Greenberg, & DeKlyen, 1990).

Purpose of the Study

The purpose of this quantitative study was to investigate how early mother-child attachment and teacher-child relationships influence children's later emotion regulation.

Research Questions

This study was guided by the following research questions:

Research question One (RQ1): Is there an effect of the pattern of mother-child attachment at 36 months on conflict or closeness in teacher-child relationships at 54 months, after controlling for child's gender, mother's education, and family income?

Research question Two (RQ2): Is there an effect of the pattern of mother-child attachment at 36 months on children's emotion regulation in 3rd grade, after controlling for child's gender, mother's education, and family income?

Research question Three (RQ3): Is there an effect of conflict or closeness in teacher-child relationships at 54 months on children's emotion regulation in 3rd grade, after

controlling for child's gender and effortful control at 54 months, mother's education, family income, and the pattern of mother-child attachment at 36 months?

Research question Four (RQ4): Is there a mediating effect of conflict or closeness in teacher-child relationships on the linkage between early mother-child attachment at 36 months and emotion regulation in 3rd grade, after controlling for child's gender and effortful control, mother's education, and family income?

Research question Five (RQ5): Is there a moderating effect of early mother-child attachment at 36 months on the linkage between conflict or closeness in teacher-child relationships and emotion regulation in 3rd grade, after controlling for child's gender and effortful control, mother's education, and family income?

RQ 5A: How does the effect of conflict or closeness in teacher-child relationships on children's emotion regulation in 3rd grade vary, if any, between secure attachment and avoidant attachment groups, after controlling for child's gender and effortful control, mother's education, and family income?

RQ 5B: How does the effect of conflict or closeness in teacher-child relationships on children's emotion regulation in 3rd grade vary, if any, between secure attachment and ambivalent attachment groups, after controlling for child's gender and effortful control, mother's education, and family income?

RQ 5C: How does the effect of conflict or closeness in teacher-child relationships on children's emotion regulation in 3rd grade vary, if any, between secure attachment and disorganized attachment groups, after controlling for child's gender and effortful control, mother's education, and family income?

Significance of the Study

This study advances the understanding of the associations among early mother-child attachment, teacher-child relationships and the development of children's emotion regulation. It also fills in the research gap with regard to the moderation effects of teacher-child relationships on the associations of early mother-child attachment patterns with children's emotion regulation development. This study can be beneficial for parents, researchers, educators and school psychologists, who are concerned with children's emotion regulation development. It can also provide school psychologists and other clinicians with supports in targeting specific components of teacher-child relationships for intervention to facilitate children's emotion regulation development.

CHAPTER 2: REVIEW OF THE LITERATURE

Overview of Literature Review

The issue of emotion regulation is one of the crucial parts of children's psychological development, and has aroused increasing attention among researchers. Eisenberg et al., (2005) explained that regulating emotions in accordance with situational requirements promotes effective cognitive, behavioral and social engagement. In contrast, emotion regulation difficulties are associated with various forms of psychopathology (Gross & Thompson, 2007).

According to attachment theorists, the parent–child attachment relationship is one of the important influencing factors for children's emotion regulation development. Zimmer-Gembeck et al. (2017) reviewed 23 studies on the associations of parent-child attachment with children's emotion regulation, among preschoolers, children, and adolescents. In spite of some inconsistent findings, most studies suggested significant correlation between attachment and emotion regulation. For example, Brumariu (2015) found that children with secure attachment demonstrated higher levels of emotion regulation in both typical and challenging circumstances. One of the functions of attachment relationships is to support infants' regulation of emotional arousal, especially emotions that are potentially distressing or overwhelming (Cassidy, 1994). By responding to infants' needs and interpreting the infants' signals accurately, caregivers try to keep arousal within the infant's limits of neural activities. Thus, the early attachment relationship shapes infants' emotion regulation development (Kerns, 2008; Thompson, 2008). However attachment is not the issue only related to

infancy; instead, it is a key theme throughout one's development (Boldt, Kochanska, Grekin, & Brock, 2016). Few longitudinal studies have studied the linkages between early attachment security and emotion regulation in middle childhood, but there is some evidence that the influence of attachment relationships extend to later childhood (Contreras, Kerns, Weimer, Gentzler, & Tomich, 2000; Kerns, 2008; Kerns, Abraham, Schlegelmilch, & Morgan, 2007).

Teacher-child relationships in the early years may play a similar role as what parent-child attachment does (Verschueren & Koomen, 2012), and haven been found to have great impacts on children's cognitive and social development (Davis, 2003). Although few studies directly assessed the influence of early teacher-child relationships on children's emotion regulation development, many researchers have argued that early relationships with a teacher may influence children's emotion regulation development (Birch & Ladd, 1997; Burchinal, Peisner-Feinberg, Pianta, & Howes, 2002; O'Connor & McCartney, 2007; Pianta, 1994; Pianta & Stuhlman, 2004). Moreover, Davis (2003) argued that teacher-child relationships may compensate for the insecure attachment experiences of children.

This chapter clarifies critical concepts of this study, and presents findings in the field of research on emotion regulation. It also focuses on assessing the associations of early mother-child attachment and teacher-child relationships with children's emotion regulation in middle childhood, and discusses whether teacher-child relationships may moderate the associations of early attachment with children's emotion regulation development.

Conceptualization of Emotion Regulation

Definition of Emotion Regulation

The concept of emotion regulation has been applied to various phenomena, which has led to diverse definitions emerging from various concerns in the relevant literature (Cole et al. , 2004). However, Thompson (1994) believes that "many researchers share a common intuitive understanding of what is meant by emotion regulation" (p. 27). One of the most frequently cited definitions of emotion regulation provided by Eisenberg and Spinrad (2004) is that

> The processes of initiating, avoiding, inhibiting, maintaining, or modulating the occurrence, form, intensity, or duration of internal feeling states, emotion-related physiological and attentional processes, motivational states, and/or the behavioral concomitants of emotion in the service of accomplishing affect-related biological or social adaptation or achieving individual goals (p.338).

This is similar to the definitions from Kopp (1989), Thompson (1994) and Grolnick, Bridges, and Connell (1996).

To better understand this concept, there are a few aspects that should be addressed. First, emotion regulation involves both intrinsic and extrinsic processes (Gross, 2014; Morris et al., 2007; Thompson, 1994). Intrinsic processes refer to attention shifting, cognition of emotions, and the regulation of physiological responses. Extrinsic processes involve seeking help from others to modulate emotions. Initially, infants are unable to self regulate, and they depend almost entirely on external regulation provided by caregivers. As their brain develops, they gradually reorganize regulation and shift to self-regulation of emotions.

Second, emotion regulation processes involve sequential steps, namely initiating, maintaining, and modulating emotions (Eisenberg & Spinrad, 2004). Before an emotion is experienced it must be initiated. Individuals have some control over whether or not an

emotion is initiated. For example, an individual can avoid certain emotional situations or utilize cognitive strategies to regulate the emotion (Gross, 2014). After an emotion is initiated, it may then lead to the processes of maintaining, inhibiting, or enhancing (Thompson, 1994). Although emotion regulation is often viewed as aiming at inhibiting the magnitude or duration of negative emotions, it may also target the enhancement of positive emotions (Gross, 2014).

Third, emotion regulation processes also manage the intensity and expression of emotions (Calkins and Hill, 2007). Thompson (1994) explained that emotion regulation mechanisms modulate 'emotional tone' and 'emotional dynamics'. Emotional tone refers to the specific emotion experienced by an individual (e.g., anger and sadness). Emotional dynamics involve the range, rise time, intensity, latency, lability, persistence, and recovery of an emotion. Previous research has much more focused on emotional tone rather than on emotional dynamics. However, Thompson (1994) and Walden and Smith (1997) pointed out that researchers must examine the cycle of emotional expression in order to fully understand emotion regulation processes.

Finally, emotion regulation can be viewed as adaptive and functional processes in an individual. Gross and Thompson (2007) stated that emotion regulation does not only focus on negative emotional experiences but also involves positive emotion regulation. Most researchers who study on emotion regulation agree with this understanding, and view emotions as adaptive. Indeed, one important objective of emotion regulation development is for children to learn how to modulate emotions in according to social norms (Kopp, 1992).

Developmental Model of Emotion Regulation

The developmental model views emotion regulation development in children as being sequential in nature (Cole et al., 2004), which is influenced by intrinsic and extrinsic factors, integrating over time (Fox & Calkins, 2003). As a complex construct involving social-emotional, linguistic and cognitive elements, emotion regulation is connected to the development of these domains over time (Denham, 1998; Kopp, 1982). Key intrinsic factors related to emotion regulation include the temperamental disposition of the child, cognitive skills, and underlying neurophysiological systems (Calkins, 1994; Fox, 1994). Multiple regions in the prefrontal cortex are related with emotion regulation. The maturation of these regions enables emotion regulation through better attentional/effortful control, impulse-inhibition, and the use of working memory to generate alternative responses (Kevin & Gross, 2014).

Extrinsic factors include interactions with caregivers and peers, attachment, parenting practices, parenting style, and parent characteristics (Fox & Calkins, 2003; Morris, Silk, Steinberg, Myers and Robinson, 2007). Through providing supportive and responsive environments, caregivers support children to develop adaptive emotion regulation skills (Fox & Calkins, 2003).

Emotion regulation skills emerge in early infancy to modulate basic emotional processes such as states of arousal and reactivity (Kopp, 1982). Infants' temperament leads to differences in emotion regulation, such as the reactivity to a stimulus and self-regulation of the initial emotional reaction to that stimulus (Rothbart & Bates, 1998). Observable behaviors of emotion regulation include self-soothing, gazing at aversion, 'shutting down' by

going to sleep, or seeking proximity to a caregiver (Rothbart & Bates, 1998; Saarni, 1999; Thompson & Goodvin, 2007). Initially, infants rely exclusively on their caregivers to regulate their emotions. With age, children are expected to shift from largely depending on external sources to mainly relying on internal sources to regulate emotion (Roll et al. , 2012). In conjunction with developmental advances in cognitive, motor, and language domains, toddlers are able to practice emotional self-regulation, and acquire a set of self-regulatory strategies. On the one hand, they have less self-soothing behaviors. On the other hand, the more complex use of objects and interactions to regulate emotion begin to emerge (Diener & Mangelsdorf, 1999; Thompson, 1994).

Preschoolers begin to interact in new and different ways within peer-based and school settings (Denham, 2007). They exhibit behavioral strategies such as self-soothing to modulate emotion, altering the expression of an emotional state (e.g., smiling when feeling anxious), or avoiding situations that invoke unpleasant emotions (Denham, 2007). They can also utilize cognitive strategies to regulate emotion, such as giving up a goal, choosing a new goal, making a new causal attribution, refocusing attention, or using problem-solving reasoning to increase their comfort in a situation or their ability to accept an unwanted conclusion (Denham, 2007).

Cognitive development during middle childhood enables more advanced awareness and understanding of emotion and allows for the conceptualization and consideration of more mature emotion regulation strategies (Denham, 1998; Saarni, 1999). When children come to the middle childhood, they still rely on many of the same emotion regulation strategies used at earlier developmental stages, such as support seeking, distancing, distraction, and

denial. With age, children learn to select strategies based on their utility in a given situation (Saarni, 1997), and also prefer more advanced strategies through practice (Saarni, 1999; Eisenberg et al., 1993).

Emotion Regulation and Later Outcomes

Social Adjustment

Numerous studies have shown evidence supporting the association of children emotion regulation with social adjustment. For example, Eisenberg, Fabes, Bemzweig, Poulin and Hanish (1993) and Eisenberg et al. (1997) found significant associations of adaptive emotion regulation strategies with peer status and relationship quality, prosocial behavior, and social competence in children and adolescents. Roll et al.'s study (2012) showed that emotion regulation problems can cause later development of aggressive behaviors. To inhibit aggressive or socially unacceptable responses during social interactions, the capability of adaptively regulating emotions is essential (Bowie, 2010). Denham, Blair, Schmidt and DeMulder (2002) found that emotion regulation ability predicted later social competence. Specifically, dysregulated anger was significantly correlated with social incompetence. In general, children with difficulties in regulating emotions in a flexible and adaptive way are less likely to experience success in peer interactions (Calkins & Hill, 2007).

School Functioning

Adaptive emotion regulation strategies are essential for successful school functioning. Calkins (1994) and Eisenburg et al. (2002) explained that children with adaptive emotion regulation strategies have better adjustment in their behavior, attention, motivation and

cognitions in accordance with school requirements. Adaptive emotion regulation strategies have been positively correlated with children's academic outcomes (Li-Grining, Votruba-Drzal, Maldonado- Carreno & Haas, 2010), and students' grade point average (Gumora & Arsenio, 2002). In contrast, those with poorer emotion regulation skills have been negatively correlated with quality of relationships with teachers and peers, and ability of following classroom routines (Eisenberg et al, 2005). Research suggests that emotion regulation may be an important component of overcoming school difficulties (Cunningham, Raffaele Mendez & Sundman-Wheat, 2011).

Psychopathology

Difficulties with emotion regulation have been found to be associated with many forms of psychopathology (Gross & Thompson, 2007) including anxiety disorders, major depression, bipolar disorder and ADHD (Joormann & Siemer, 2014; Campbell-Sills, Ellard & Barlow, 2014). Moreover, many clinical disorders are associated with emotional dysregulation and have been conceptualized as demonstrating an imbalance of the processes involving emotion management (Oschner & Gross, 2007; Mullin & Hinshaw, 2007). Many childhood and adolescent clinical disorders were found to be stemming from either over-regulation or under-regulation of emotion which correspond with internalizing or externalizing problems, respectively (Mullin & Hinshaw, 2007). In addition, Li and Han (2018) pointed out that children who had defects in emotion regulation were likely to experience various forms of internalizing and externalizing problems. Folk, Zeman, Poon, and Dallaire (2014) conducted a 2-year longitudinal study among more than one hundred elementary students, and found that children's poor emotion regulation ability may be linked

to deterioration of depressive symptoms. By reviewing and integrating relevant studies in the field of emotion regulation and aggression, Roberton, Daffern, and Bucks (2012) discovered an association between anger regulation and aggressive behaviors among adolescents.

Attachment and Emotion Regulation

Attachment theories are regarded as important frameworks for understanding how caregiver-child relationships are related to children's development. Attachment security is associated with resilience and positive outcomes in the childhood years and in adulthood (Grossmann, Grossmann, & Kindler, 2005; Sroufe, 2005). Children with secure attachment tend to have more effective and satisfying relationships with parents, friends, and teachers than children with insecure attachment patterns do. Children with secure attachment are better at social problem solving, at lower risk for psychopathological problems and trouble with the law and have better academic performance and fewer behavior problems than their insecure peers (e.g., Sroufe, 2005; Sroufe, Egeland, Carlson, & Collins, 2005).

One of the defining features of attachment system is helping children to regulate emotions. Bowlby (1969) mentioned that interactions with caregivers in one's infancy and early childhood form an important foundation for his/her emotion regulation across the lifespan. Children with secure attachment use the caregiver effectively in building up their own emotion regulation; in contrast, children with insecure attachment have difficulties in seeking help from their caregivers to regulate their emotions (Bowlby, 1982). The longer-term outcome of the early supportive caregiver-child relationships is that the child's brain builds an increasingly sophisticated structure of neural connections and subroutines—a

structure that results in effective rhythms of soothing; co-regulation of thoughts, emotions, and behavior; and abilities for self-control (Schore, 2001, 2005).

Although studies assessing attachment and emotion regulation beyond early childhood are relatively few (Kerns, 2008), evidence of the linkages of early attachment patterns and later emotion regulation does exist in the literature and empirical studies. For example, Cooper, Shaver and Collins (1998) proposed that unlike secure children who are able to recognize and then effectively regulate negative emotions, avoidant and anxious children often fail to regulate negative emotions. This is consistent with Kerns et al.'s (2007) findings that secure attachment is related to better regulation of emotion in the classroom in later middle childhood. Gilliom et al. (2002) also showed that secure attachment correlated positively with effective regulatory strategy use. In their study, boys with secure attachments used more strategies, such as distraction, asking questions when frustrated about the task, and waiting for help quietly, than those with insecure attachment. Furthermore, Moutsiana and colleagues (2014) found the associations of individuals' attachment patterns and neural responses during the emotion regulation processes of positive emotion 20 years later. In a recent review of 23 studiesinvestigating the associations between parent-child attachment and children's emotion regulation, 22 of them showed some significant results, among which 5 studies investigated elementary school year children, and 4 studies focused on adolescences (Zimmer-Gembeck et al., 2017).

Attachment Perspectives on the Teacher-child Relationships

Conceptualization of the Teacher-child Relationships

From an attachment perspective, the teacher-child relationships could be considered as "an extension of the parent-child relationship" (Davis, 2003, p 209), which reflect the emotional bond between teacher and child. Teacher-child relationships greatly influence children's explorative behaviors and their emotional and cognitive regulation skills (Davis, 2003; Verschueren & Koomen, 2012). Based on the ideas of Pianta and Steinber (1992), Birch and Ladd (1997) suggested that there are three qualitatively different aspects of the teacher-child relationships, namely closeness, conflict, and dependency. Low levels of conflict and dependency, and high levels of closeness are characterized as positive, high quality teacher-child relationships (Hamre & Pianta, 200; 1McCormick and O'Connor, 2015).

In characterizing the teacher-child relationship, closeness is regarded as "the degree of warmth and open communication that exists between a teacher and child" (Birch & Ladd, 1997, p.62). Closeness may also refer to the degree of comfort of children approaching teachers (Sabol, Robert & Pianta, 2011). Based on attachment theory, the children who are close to their teacher can be considered to have a 'secure base' (Birch & Ladd, 1997). There are positive correlations of teacher-child closeness and children's academic achievement and overall school adjustment (Birch & Ladd, 1997; Burchinal et al., 2002; Pianta & Stuhlman, 2004; Pianta et al., 2005).

Conflict specifies the negative aspects of teacher-child relationships (Sabol et al., 2011). Birch and Ladd (1997) pointed out that "conflictual teacher-child relationships are characterized by discordant interactions and a lack of rapport between the teacher and the

child" (p.63). Teacher-child conflict may lead to children's poor academic achievement (Birch & Ladd, 1997). In addition, Pianta and Stuhlman (2004) found that higher levels of teacher-child conflict were significantly correlated with children's externalizing behavior problems and social competence. This is consistent with Pianta and Sternberg's (1992) and Pianta and colleagues' (2005) findings that teacher-child conflict associated with children's learning, behavioral and social competence problems, and grade retention.

Dependency as another characteristic of the teacher-child relationship is regarded as "possessive and 'clingy' child behaviours that are indicative of an overreliance on the teachers as a source of support" (Birch & Ladd, 1997, p.62). Birch and Ladd (1997) and Howes et al. (1994) have found that overly dependent relationships with teachers may lead to less exploration, interference with school adjustment, and interference with social relationships with peers. Children who are less dependent on their teachers score higher on academic performance than those who are more dependent on their teachers (Birch & Ladd, 1997). Therefore, over dependence on adult interferes with environmental mastery and peer relations, which would be maladaptive (Birch & Ladd, 1997). It is optimal for children to express dependency in more age appropriate ways (Sroufe, Fox & Pancake, 1983).

Teacher-child Relationships and Later Outcomes

Research has shown that teacher-child relationships have both short-term and long-term impacts on children's cognitive, social-emotional, and behavioral development (Birch & Ladd, 1997; Davis, 2003). Significant associations have been found between teacher-child relationships and aggression, prosocial behavior, play with peers and adults (Howes, Hamilton & Matheson, 1994), concept development (Pianta, Nimetz, & Bennett,

1997), tolerance of frustration, academic and social skills, social competence (Pianta & Steinberg, 2004), classroom achievement (Davis, 2001), children's attitudes and involvement in school, adjustment to school, visual and language skills, math and reading achievement and overall school performance (O'Conner & McCartney, 2007; McCormick, O'Connor, Cappella & McClowry, 2013).

Hamre and Pianta (2001) stated that children with high level of teacher-child conflict and dependency showed various negative academic and behavioral outcomes from kindergarten through eighth grade. This is consistent with the findings of Roorda, Koomen, Spilt, and Oort (2011) and Rudasill (2011) that children's academic performance is linked to and supported by teacher-child relationships. Furthermore, McCormick, Apos, Connor, and Parham Horn, (2017) found that the closeness and conflict within teacher-child relationship were important factors for academic achievements in elementary school children, and such influence was especially significant for children in low SES.

Rationales of Teacher-child Relationships Playing a Moderating Role

Although there was little longitudinal research directly assessing the impacts of teacher-child relationships on children's emotion regulation, it has been suggested that teacher-child relationships may affect children's emotion regulation (Birch & Ladd, 1997; Hamre & Pianta, 2001; O'Connor & McCartney, 2007; Pianta, 1994; Pianta & Stuhlman, 2004). In one recent study, Pallini and colleagues (2019) investigated the association of student-teacher relationship and emotion regulation of children aged from 8- to 10-year-old. Using the Emotion Regulation Checklist to assess children's emotion regulation, their study found positive correlations between student–teacher relationships and emotion regulation.

Evidence of the moderation effect of teacher-child relationships has been found in the studies of associations of attachment with child's development in the other fields. For example, Hughes, Cavell and Jackson (1999) found that having high quality teacher-student relationships was beneficial for children with unsupportive parenting histories. Positive teacher-child relationship might compensate for their insecure attachment experiences (Buyse et al., 2011; Meehan, Hughes, & Cavell, 2003). Children with insecure attachment history may obtain an opportunity through interactions with teachers, to experience security (Davis, 2003).

Summary and Implication

The current body of research has demonstrated some connections between early attachment and the children's emotion regulation development (Gilliom, Shaw, Beck, Schonberg & Lukon, 2002; Kerns, Abraham, Schlegelmilch & Morgan, 2007; Moutsiana et al., 2014). However, how do early attachment relationships influence on children's later emotion regulation development is still unclear. Thompson (2008) pointed out that to understand the associations of early attachment relationships with later psychological development. It may be more productive to conduct research on the intervening processes or mechanisms that connect them. It has been suggested that teacher–child relationships may moderate the associations of early attachment relationships with children's emotion regulation in late childhood (e.g. Davis, 2003; Birch & Ladd, 1997; Burchinal et al. , 2002; Meehan et al., 2003; O'Connor et al. , 2012; Pianta, 1994; 1999; Pianta & Stuhlman, 2004). However, little longitudinal research has been carried out to investigate the moderation role of teachers-child relationships. Thus, it is important to study the mediation and modereation

role of teacher-child relationship on the association of early attachment relationships with children's emotion regulation in late childhood, as a future research direction in the overall field.

CHAPTER 3: METHODOLOGY

Research Design

A multivariate correlational research design was used in this study to explore the strength of the relationships among early mother-child attachment, teacher-child relationships and child's later emotion regulation. "Correlational research refers to studies in which the purpose is to discover relationships between variables through the use of correlational statistics" (Gall, Gall, & Borg, 1996, p. 332). The variables considered in this study were mother-child attachment at 36 months, teacher-child relationships at 54 months, children's emotion regulation in 3rd grade, child's gender, child's effortful control at 54 months, mother's education, and family income. The purpose of this study was to investigate how early mother-child attachment and teacher-child relationships influence children's later emotion regulation.

Research Questions

The following research questions were used to guide the methodology of the study:

Research question One (RQ1): Is there an effect of the pattern of mother-child attachment at 36 months on conflict or closeness in teacher-child relationships at 54 months, after controlling for child's gender, mother's education, and family income?

Research question Two (RQ2): Is there an effect of the pattern of mother-child attachment at 36 months on children's emotion regulation in 3rd grade, after controlling for child's gender, mother's education, and family income?

Research question Three (RQ3): Is there an effect of conflict or closeness in teacher-child relationships at 54 months on children's emotion regulation in 3rd grade, after

controlling for child's gender and effortful control at 54 months, mother's education, family income, and the pattern of mother-child attachment at 36 months?

Research question Four (RQ4): Is there a mediating effect of conflict or closeness in teacher-child relationships on the linkage between early mother-child attachment at 36 months and emotion regulation in 3rd grade, after controlling for child's gender and effortful control, mother's education, and family income?

Research question Five (RQ5): Is there a moderating effect of early mother-child attachment at 36 months on the linkage between conflict or closeness in teacher-child relationships and emotion regulation in 3rd grade, after controlling for child's gender and effortful control, mother's education, and family income?

RQ 5A: How does the effect of conflict or closeness in teacher-child relationships on children's emotion regulation in 3rd grade vary, if any, between secure attachment and avoidant attachment groups, after controlling for child's gender and effortful control, mother's education, and family income?

RQ 5B: How does the effect of conflict or closeness in teacher-child relationships on children's emotion regulation in 3rd grade vary, if any, between secure attachment and ambivalent attachment groups, after controlling for child's gender and effortful control, mother's education, and family income?

RQ 5C: How does the effect of conflict or closeness in teacher-child relationships on children's emotion regulation in 3rd grade vary, if any, between secure attachment and disorganized attachment groups, after controlling for child's gender and effortful control, mother's education, and family income?

Sample

Analyses in the present study were conducted on the dataset from phases I, II and III of the longitudinal National Institute of Child Health and Human development Early Child Care Research Network of Study of Early Child Care and Youth Development (NICHD SECCYD). The sample of this dataset was geographically, ethnically, and economically diverse, which included 1,364 families with healthy newborns in 1991 (NICHD ECCRN, 2001). The participants in the NICHD study were recruited in 1991from women giving birth in hospitals in ten cities: Little Rock, Arkansas; Irvine, California; Lawrence, Kansas; Boston, Massachusetts; Philadelphia, Pennsylvania; Pittsburgh, Pennsylvania; Charlottesville, Virginia; Morganton, North Carolina; Seattle, Washington; and Madison, Wisconsin. The families were excluded from the sample if the child was hospitalized for more than 7 days following birth or had obvious disabilities, the mother was under 18 years of age, did not speak English or had a known or an acknowledged substance-abuse problem, the family lived in a distant or dangerous neighborhood, or planned to move from the area within 3 years (NICHD ECCRN, 2001).

Phase I data were collected from 1991 to 1994 and contained 1,364 children from birth to 3 years of age. Phase II data were collected from 1995 to 1999 and contained 1,226 children from 54 months of age through 1st grade. Phase III data were collected from 2000 to 2004 and contained 1,061 children from 2nd through 6th grades (NICHD ECCRN, 2001; O'Connor et al., 2012; Rudasill, 2011). There were 994 children who were still involved in the NICHD SECCYD in third grade (O'Connor et al, 2012). Families who were still involved in the NICHD SECCYD were significantly different from those who were not in

terms of gender, ethnicity, maternal education, and family income. Families leaving the study were more likely to be ethnic minorities, to have low levels of maternal education, and have low incomes (O'Connor et al, 2012). Participants who did not complete the related assessments were excluded from the dataset for this study. The resulting sample for the current study included 694 children (340 boys and 354 girls). Table 1 shows the demographic characteristics of the whole sample and participants included in the current study. Of the participants, 80.4% were white, the average mother's education was 14.74 years, and the average family income at 36-month, measured as the income to needs ratio was 4.0, which is way above the poverty line.

Table 1

Demographic characteristics of the whole sample and the participants

	Whole Sample		Participants of Current Study	
	N	*M(SD) %*	*N*	*M(SD) %*
Child's gender				
Female	659	48.3%	354	51%
Male	705	51.7%	340	49%
Child's ethnicity				
White	1097	80.4%	590	85%
Black	176	12.9%	66	9.5%
Asian	22	1.6%	8	1.2%
Other	69	5.1%	30	4.3%
Mother's education	1363	14.23(2.513)	694	14.74(2.408)
Family Income at 36-month	1208	3.523(3.121)	690	4.0(3.285)

Note. Scores of mother's education represented years of schooling; family income scored 0-1 represented poverty; 1-1.8 represented near poverty; and over 1.8 were non-poor (NICHD ECCRN, 1997).

Variables

Outcome (Endogenous) Variables

For research question one, the outcome variables were closeness and conflict in teacher-child relationships at 54 months. For research questions two, three and four, the outcome variables were the three emotion regulation variables in 3rd grade, namely child's emotion reactivity, negative affect toward teacher, and negative engagement with peers. All the outcome variables were continuous.

Predictor (Endogenous) Variables

Closeness and conflict in teacher-child relationships at 54 months also served as predictor variables for question three and four. The other predictor variable was mother-child attachment at 36 months. Mother-child attachment was a categorical variable, which included the following subgroups: secure, avoidant, ambivalent, and disorganized. The study used dummy coding techniques to create three dummy variables, representing the three attachment subgroups: avoidant, ambivalent, and disorganized. Secure attachment was treated as the reference group, coded "0" on all three dummy variables.

Control (Exogenous) Variables

For research question one and two, the control variables included child's gender, mother's education, and family income. For research question three, four and five, the control variables included child's gender, child's effortful control, mother's education, and family income. Child's gender was a categorical variable. One dummy variable was created for child's gender. Boy was treated as the reference group, and coded as "0" on the variable. The other variables were all continuous ones.

Mediator, Moderator (Endogenous) Variables

The mediator and moderator variables used in research questions four and five are closeness and conflict in teacher-child relationships in 3rd grade.

Instrumentation

The following instrument descriptions were summarized from the NICHD- SECCYD Phase I, II and III Instrument Documents. These documents can be found on the study's website (http://www. nichd. nih. gov/research/supported/seccyd/overview. cfm).

Child's Gender

Child's gender was obtained from the One Month Interview developed to meet the data collection needs of the NICHD. The interview was designed to collect specific information from all mothers.

Mother's Education

Mother's education was also obtained from the One Month Interview. It was measured in years of schooling.

Family Income

Family income was measured as the income to needs ratio. The income-to-needs ratio was an index of family SES, which referred to financial resources per person in the household. Values 0-1 represented poverty; 1-1.8 represented near poverty; and values over 1. 8 were non-poor (NICHD ECCRN, 1997). Information required to create this variable was obtained during the Six Month Interview. The income to needs ratios measured at 36 months were used to indicate family income in this study.

Child's Effortful Control

Mothers filled in an abbreviated version of the Children's Behavior Questionnaire (CBQ; Rothbart, Ahadi, & Hershey, 2001), when children were at 54 months. It is applicable for children aged 3–8 years. The CBQ uses a seven-point Likert-style scale, where 1 = extremely untrue, and 7 = extremely true. Parent responses on eight subscales were gathered for the NICHD SECCYD, but data from only two subscales were used in this study, namely Inhibitory Control and Attentional Focusing subscales. Children's scores on Inhibitory Control and Attentional Focusing subscales were averaged to produce a measure of Effortful Control. The Inhibitory Control subscale measures children's abilities of inhibiting inappropriate behaviors and following directions. The Attentional Focusing subscale measures children's abilities of focusing and sustaining attention as needed. Cronbach's alpha for Inhibitory Control and Attentional Focusing subscales together was .84.

Emotion Regulation

To measure emotion regulation, *Parent Report of Children's Reactions* scale, and the Negative Affect toward Teacher and Negative Engagement with Peers scales from the *Classroom Observation System, Third Grade (COS-3)* were used in the study.

Mothers and fathers completed The Parent Report of Children's Reactions scale separately. The questionnaire with 10 items measures respondents' perceptions of how their child expresses emotions in response to events. Questions within the scale asked parents to rate their child's frequency of emotional reactivity on a five-point scale with a lower number indicating a lower frequency of reactivity and vice versa. Child Emotional Reactivity Score is computed as the sum of responses to items 1 to 10. Possible scores range from 10 to 50,

with higher values indicating a higher perceived emotional reactivity of the child. Reliabilities for child emotional reactivity score for mother was .76, and for father was .69. Mother's and father's responses on the ten items were average to indicate child's overall emotional reactivity in this study.

The *COS-3* observations were taken using codes for discrete behaviors assessed by means of a time sampling technique. The study child was observed in regard to the target behavior using 30 second intervals of observation followed by 30 seconds of data recording. Each observation cycle lasted for 10 minutes with eight cycles conducted for each target student. Observers were trained using a detailed manual of procedures and a master coded video segment. Post-training practice and feedback were given followed by the requirement to pass a videotaped certification test. The Negative Affect toward Teacher and Negative Engagement with Peers scales of the *COS-3* were used as indicators of children's emotion regulation in this study.

Mother-child Attachment

A modified Strange Situation procedure was used to classify children's attachment patterns at 36 months (Cassidy, Marvin, & the MacArthur Attachment Working Group on Attachment, 1992). In this procedure, children's behaviors in two separation phases and two reunion phases were specifically coded to classify them into four groups, in according with the system developed by the MacArthur Attachment Working Group on Attachment (Cassidy et al, 1992). The classification system is presented in Table 2.

Table 2

The MacArthur coding system

Group	Description
Secure (B)	Children are able to resolve the stress of separation and resume clam, comfortable interactions with the parent.
Avoidant (A)	Children interact with their mothers neutrally, and show limited emotional expressions towards them during the separation and reunion.
Ambivalent (C)	Children protest to separate with mothers, and show fussy, helpless, whiny, and/or resistant behavior toward the parent.
	Children are either controlling or show combinations of strategies.
Disorganized (D)	Controlling children take charge of the reunion (punitive or caregiving).

There is some evidence for the validity of The MacArthur coding system. It has been shown to be linked to maternal sensitivity (NICHD ECCRN, 2001).

Closeness and Conflict in Teacher-child Relationships

The Student-Teacher Relationship Scale (STRS) was used to measure teacher-child relationships quality at 54 months (Pianta, 1992). A five-point Likert scale was used, where 1 = definitely does NOT apply, and 5 = definitely applies. Teachers rated how applicable statements are to their current relationship with a particular child. The *Closeness subscale* includes eleven items, and measures the amount of warmth and open communication in the relationship. The *Conflict subscale* includes twelve items, and measures how much the relationship is marked by antagonistic and disharmonious interactions. Teachers completed the STRS in spring, allowing sufficient time for the teacher-child relationships to be built (O'Connor et al., 2012). STRS has been extensively used in studies of preschool- and elementary-age children. Over a 4-week period, test-retest reliability was .89 (total score), .88 (closeness), .92 (conflict), and .76 (dependency). The internal consistency is .64 (Dependency), .86 (Closeness), .92 (Conflict), and .89 for the total scale. Evidence for construct validity, including results of exploratory factor analysis, coefficients of concurrence

with behaviors related to the STRS, and coefficients of prediction with related behavior over time were also found. These coefficients were high enough to provide strong validity evidence for interpreting scores from Closeness and Conflict subscales, but not for interpreting scores from Dependency subscale (Pianta, 2001), which was not used in this study.

Data Analysis

Before data analysis, violations of the assumptions of path analysis were examined using IBM SPSS Statistics, which involved multicollinearity, normality, nonlinearity, homoscedasticity, and data problem diagnostics of distance, leverage and influence. To analyze the violations of the assumptions, missing data were imputed by Analysis of Moment Structures (AMOS) software's full information maximum likelihood procedure, and then each outcome variable was regressed on all other variables simultaneously.

Path analyses were conducted via structural equation modeling (SEM) using Analysis of Moment Structures (AMOS) software to investigate all the research questions. Missing data were estimated with AMOS' full information maximum likelihood procedure. Path analysis can be considered as "an extension of multiple regression", which "allows a researcher to test a theory of causal order among a set of variables" (Klem, 1995, p.65). Based on the literature reviewed in Chapter 2, hypothesized path models were constructed for the five research questions.

The hypothesized path model for research question one is shown in Figure 1(see Appendix A). In the model there are three blocks of variables. The first block contains the control (exogenous) variables, namely child's gender, mother's education and family income.

The second block contains three independent (endogenous) variables, namely the three dummy variables of early mother-child attachment. The third block contains two dependent (endogenous) variables of teacher-child relationships. Directed arrows were drawn from control variables to dependent and independent variables and from independent variables to dependent variable. Mother's education and family income were allowed to be associated using double end arrows. Errors of three dummy variables of mother-child attachment were allowed to be associated. Errors of the two teacher-child variables were allowed to be associated.

The hypothesized path model for research question two is shown in Figure 2 (see Appendix A). In the model, there are also three blocks of variables. The first block contains the same control (exogenous) variables as for research question one. The second block contains the same three independent (endogenous) variables. The third block contains three dependent (endogenous) variables indicating children's emotion regulation. The same as the path diagram for research question one, directed arrows were drawn from control variables to dependent and independent variables and from independent variables to dependent variable. Mother's education and family income were allowed to be associated using double end arrows. Errors of three dummy variables of mother-child attachment were allowed to be associated. Errors of the three emotion regulation variables were allowed to be associated.

The hypothesized path model for research question three and four is shown in Figure 3 (see Appendix A). In the model there are also five blocks of variables. The first block contains the same control (exogenous) variables as for research question one. The second

block contains the three endogenous dummy variables of mother-child attachment, which serves as the control variable for research question three. The third block contains one endogenous variable indicating child's effortful control, which serves as the control variable for research question three as well. The fourth block contains two independent (endogenous) variables of teacher-child relationships. The fifth block contains three dependent (endogenous) variables indicating children's emotion regulation. The same as the path diagram for research question one and two, directed arrows were drawn from exogenous variables to all endogenous variables, from three dummy variables of mother-child attachment to child's temperament variable, from two sets of extra control variables to dependent and independent variables, and from independent variables to dependent variable. Mother's education and family income were allowed to be associated using double end arrows. Errors of three dummy variables of mother-child attachment were allowed to be associated. Errors of two teacher-child relationship variables were allowed to be associated. Errors of the three emotion regulation variables were allowed to be associated.

The hypothesized initial path model for research question five is shown in Figure 4 (see Appendix A). The first block contains the same control (exogenous) variables as for research question one. The second block contains one extra control (endogenous) variable indicating child's effortful control. The third block contains two independent (endogenous) variables of teacher-child relationships. The fourth block contains three dependent (endogenous) variables indicating children's emotion regulation. The same as the path diagram for research question one, two, three and four, directed arrows were drawn from exogenous variables to all endogenous variables, from one extra control variable to

dependent and independent variables, and from independent variables to dependent variable. Mother's education and family income were allowed to be associated using double end arrows. Errors of two teacher-child relationship variables were allowed to be associated. Errors of the three emotion regulation variables were allowed to be associated.

Path analyses produced coefficients for each path, as well as a variety of goodness-of-fit indices for the model as a whole. Chi-square ($\chi 2$), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Root Mean-Square Error of Approximation (RMSEA) were used to assess model fit. According to Keith (2006), cutoff values greater than 0.95 for CFI and TLI, and less than 0.05 for RMSEA, in addition to a nonsignificant chi-square, are needed to conclude good fit. Standardized path coefficients were used to determine which paths in the model are significant, with the level of significance set at 0.05.

To address research question 5A, 5B, and 5C, three sets of multi-group models were estimated. In each multi-group model, the secure attachment group was compared with one of the three insecure attachment groups. The moderating effects were examined by first determining whether the model fit the data equally well for both groups. Then, one path from teacher-child relationship variables to emotion regulation variables was constrained to be the same for the two groups at a time. Model comparisons were assessed using changes in chi-square.

Limitations

One limitation of this study is that the NICHD SECCYD sample was determined to not be nationally representative. With several criteria for sample selection, the participants

remained in the data set are at relatively low-risk. However, the exclusion of at-risk families may impact the interpretation and generalizability of the findings. Secondly, the study only focuses on mother-child attachment, without considering father-child attachment, which may play similar or different role in child development. Future studies may assess the influences of mother-child attachment together with father-child attachment on children's emotion regulation. Thirdly, this study only looks at the teacher-child relationships at 54th month. Future studies may investigate the associations between developmental trajectories of teacher-child relationships during childhood and children's emotion regulation. Finally, children's emotion regulation at early stages was not measured in this study. Future research might also test the possibility of a bidirectional relationship between teacher-child relationships and children's emotion regulation. Such analyses would provide information regarding the effect of teacher-child relationships on children's emotion regulation, the effect of children's emotion regulation on teacher-child relationships, and which effect is stronger.

Summary

This quantitative study utilizes a multivariate correlational design. The chapter introduced the sample of the study, which involves data from the first three phases of the NICHD SECCYD. The chapter described the data collection procedure and data analysis plans. The study used path analysis to answer the research questions. The limitations of the study were also discussed in the chapter.

CHAPTER 4: RESULTS

Preliminary Analysis

Prior to conducting path analyses, violations of the assumptions of multiple regression were first examined for all research questions, which involved nonlinearity, multicollinearity, normality, homoscedasticity, and data problem diagnostics of distance, leverage and influence. As the same path model was used for research questions 3 and 4, and the assumptions for research question 5 were subsumed under question 3 and 4. Three sets of assumptions were checked, by regressing each outcome variable on all other variables in the path model simultaneously.

Among all the assumptions, linearity assumption is the most crucial. If this assumption is not met, all the regression estimates may be biased (Keith, 2006). To examine the linearity assumption, the unstandardized residuals were plotted against the predicted variables, and the lowess fit lines were added to the graphs. The lowess fit lines were all came close to the regression lines, and thus do not suggest a departure from linearity (see Appendix B, C, and D).

"Multicollinearity occurs when several independent variables correlate at an excessively high level with one another or when one independent variable is a near linear combination of other independent variables" (Keith, 2006, p.199). Tolerance and Variance Inflation Factor (VIF) values are often examined as the index of multicolliearity. Keith (2006) suggests that the value for tolerance is the bigger the better, while the value for VIF is the smaller the better. The values for tolerance of .17 and for VIF of 6 can be considered as

the flags for excessive multicolliearity. In the current study, no tolerance value was less than .17, and no VIF value was greater than 6 (see Appendix B, C, and D). Therefore, there is no evidence of excessive multicolliearity.

Homoscedasticity refers to "the variance of errors around the regression line is fairly consistent across levels of the independent variable" (Keith, 2006, p.190). To check for whether there was a violation of homoscedasticity, predicted variables were collapsed into five equal categories to compare the variance of the residuals at each of these five levels. In the present study, the ratios of high to low variance were all far less than 10 (see Appendix B, C, and D). So, there was no evidence supporting that homoscedasticity assumption was violated.

Normality of residuals assumption refers to whether the residuals are normally distributed (Keith, 2006). To check for whether there was a violation of this assumption, histograms and p-p plots were used. In the present study, the residuals all formed a near normal curve, and the residuals conformed fairly well to the superimposed straight line. Therefore, the residuals were normally distributed.

To diagnose any additional data problems, distance, leverage and influence were also checked. Distance refers to the exanimation of cases that are far away from the regression line (Keith, 2006). According to Keith (2006) cases with standardized residuals greater than the absolute value of 2 are identified as having high distance. However, data with sample sizes greater than 200 may have many cases with high standardized residuals. In the current study, the sample size is 694, and there were 0-38 cases having high distance. Leverage assesses the pattern of independent variables without regard for the dependent variable (Keith,

2006). The reference values used to identify high values of leverage were calculated using the formula of 2*((k + 1) / n) (k = number of independent variables). Twenty-nine to forty-four cases were found with high estimated values of leverage. Influence checks the cases that, if removed from the regression, the regression results can be substantially changed. The cases with largest Cook's *D* and standardized DF Beta values were checked, which provides values of an estimate of influence (Keith, 2006). A holistic evaluation based on the above indices revealed that there were several cases that were heavily influential on the regression line. However, none of them appeared consistently across all indices. Overall, the data were acceptable. Therefore, the original 694 cases were used to conduct the following analyses.

Main Analysis

Path analyses were conducted via structural equation modeling (SEM) using Analysis of Moment Structures (AMOS) software to investigate all the research questions. The path models of the research questions were all recursive, over-identified models. Chi-square ($\chi 2$), CFI, TLI, and RMSEA were used to assess model fit. Standardized path coefficients were used to determine which paths in the model are significant, with the level of significance set at 0.05 (see Appendix E for path models, standardized path coefficients were labeled for each path).

Research Question One

A path analysis was conducted to examine whether there was an effect of the pattern of mother-child attachment at 36 months on conflict or closeness in teacher-child relationships at 54 months, after controlling for child's gender, mother's education, and

family income. Selected goodness-of-fit statistics indicated that the hypothesized model fitted well to the data ($\chi 2 = 1.542$, p = .463; CFI and TLI > .95; RSMEA < .05) (see Figure 5 in Appendix E).

An examination of the model's standardized path coefficients revealed 4 significant direct paths in the model. Both ambivalent and disorganized attachment had a significant direct effect on teacher-child conflict (*ß* = .085, *p* = .029; *ß* = .087, *p* = .025). The ambivalent and disorganized attachment variables were generated by dummy coding procedure, using secure attachment as the reference group. Therefore, these results indicate that as compared to secure children, children with ambivalent and disorganized attachment had higher levels of teacher-child conflict. The direct relationship between disorganized attachment and teacher-child closeness was marginally significant (*ß* = -.074, *p* = .058). The direct relationship between child's gender and disorganized attachment was significant (*ß* = .077, *p* =.042). As gender variable were generated by dummy coding procedure, using boy as the reference group. Therefore, the result indicates that as compared to boys, girls were more likely to develop a disorganized attachment with their mother. Another significant direct path was found between mother's education and ambivalent attachment (*ß* = -.104, *p* = .016), which shows that mother with higher education levels were less likely to develop ambivalent attachment with their child.

Research Question Two

A path analysis was conducted to examine whether there was an effect of the pattern of mother-child attachment at 36 months on the children's emotion regulation in 3rd grade, after controlling for child's gender, mother's education, and family income. Selected

goodness-of-fit statistics indicated that the hypothesized model fit well to the data ($\chi 2$ =1.547, p = .461; CFI and TLI > .95; RSMEA < .05) (see Figure 6 in Appendix E).

An examination of the model's standardized path coefficients revealed only two significant direct paths in the model. The same as in the model of research question one, the direct relationship between child's gender and disorganized attachment was significant (ß = .077, p =.042). In addition, the direct relationship between mother's education and ambivalent attachment was significant (ß= -.104, p = .016). None of the attachment variables had a significant direct effect on the three emotion regulation variables. However, disorganized attachment had a marginally significant direct effect on child's emotion reactivity (ß= .087, p = .059).

Research Question Three

A path analysis was conducted to examine whether there was an effect of conflict or closeness in teacher-child relationships at 54 months on children's emotion regulation in 3rd grade, after controlling for child's gender and effortful control at 54 months, mother's education, family income, and the pattern of mother-child attachment at 36 months. Selected goodness-of-fit statistics indicated that the hypothesized model fit well to the data ($\chi 2$ =1. 548, p = .461; CFI and TLI > .95; RSMEA < .05) (see Figure 7 in Appendix E).

Apart from the two significant direct paths found in the models for research question 1 and 2, examination of the standardized path coefficients revealed another 9 significant direct paths in the model for research question 3. The direct relationship between teacher-child conflict and negative engagement with peers was significant (ß= .111, p = .008). That is, for every standard deviation increase in teacher-child conflict, the level of negative

engagement with peers increased by .111 standard deviations.

However, the direct effects of teacher-child conflict on child's emotion reactivity and negative affect toward teacher were insignificant (ß= .071, p = .138; ß= .067, p = .114). None of the effects of teacher-child closeness on child's emotion reactivity, negative engagement with peers or negative affect toward teacher was significant (ß= -.031, p = .495; ß= -.002, p = .960; ß=.072, p = .083).

In addition, it was found that child's effortful control was significantly predicted by disorganized attachment (ß= -.095, p = .013), child's gender (ß= .180, p < .001), family income (ß= .115, p = .006), and mother's education (ß= .185, p < .001). The direct relationship between child's gender and closeness in teacher-child relationships was significant (ß= .091, p = .018), while the relationship between effortful control and teacher-child closeness was only marginally significant (ß= .077, p = .058). Conflict in teacher-child relationships was significantly predicted by ambivalent attachment (ß= .076, p = .044), and effortful control (ß= -.261, p <.001). Child's effortful control also significantly predicted child's emotion reactivity (ß= -.158, p = .001).

Research Question Four

This question looked at whether there was a mediating effect of conflict or closeness in teacher-child relationships on the linkage between early mother-child attachment at 36 months and emotion regulation in 3rd grade, after controlling for child's gender and effortful control, mother's education, and family income. According to Baron and Kenny (1986), the following requirement should be met when concluding a mediation effect:

Step 1: The predictor variable must have a significant effect on the outcome variable.

Step 2: The predictor variable must have a significant effect on the mediator variable.

Step 3: The mediator variable must have a significant effect on the outcome variable to establish after taking the predictor variables into account.

In this model avoidant, ambivalent and disorganized attachment were the predictor variables, closeness and conflict in teacher-child relationships were the mediator variables, and child's emotion reactivity, negative affect toward teacher and negative engagement with peers were the outcome variables. As mentioned above, none of the predictor variables had a significant effect on the three outcome variables. Therefore, no further action was taken to assess the mediation effects. In other words, there was no evidence to support the mediating effect of conflict or closeness in teacher-child relationships on the linkage between early mother-child attachment and emotion regulation, after controlling for child's gender and effortful control, mother's education, and family income.

Research Question Five

To investigate whether there a moderating effect of conflict or closeness in teacher-child relationships on the linkage between early mother-child attachment at 36 months and emotion regulation in 3rd grade, after controlling for child's gender and effortful control, mother's education, and family income, a multi-group analysis SEM procedure was used for each subquestion, with one path constrained to be the same at a time.

For research question 5A, fit statistics indicated that the data fit the model well for secure and avoidant attachment groups ($\chi^2 = 3.274$, $p = .513$, CFI and TLI >.95; RSMEA <. 05) (see Figure 8, 9 in Appendix E). After constraining the path parameters across the groups, none of the resulting changes in chi-square was significant in the multi-group models,

as shown in table2. In other words, the effect of conflict and closeness in teacher-child relationships on children's emotion regulation did not vary significantly between secure attachment and avoidant attachment groups, after controlling for child's gender and effortful control, mother's education, and family income.

For research question 5B, fit statistics indicated that the data fit the model well for secure and ambivalent attachment groups ($\chi^2 = 2.092$, $p = .719$, CFI and TLI >.95; RSMEA <.05) (see Figure 10, 11 in Appendix E). After constraining the path parameters across the groups, none of the resulting changes in chi-square were significant in the multi-group models, as shown in table2. In other words, the effect of conflict and closeness in teacher-child relationships on children's emotion regulation did not vary significantly between secure attachment and ambivalent attachment groups, after controlling for child's gender and effortful control, mother's education, and family income.

For research question 5C, fit statistics indicated that the data fit the model well for secure and disorganized attachment groups ($\chi^2 = 3.722$, $p = .445$, CFI and TLI >.95; RSMEA <.05) (see Figure 12, 13 in Appendix E). After constraining the path parameters across the groups, two significant moderation effects were found in the multi-group models, as shown in table2. Path analyses of the original model revealed that the effect of teacher-child conflict on child's negative engagement with peers was significant for both groups. However, the direction of the effect was opposite for children with secure attachment (ß = .211, p <.001) and for those with disorganized attachment (ß = -.206, p =.042). For every standard deviation increase in teacher-child conflict, child's negative engagement with peers increased by .211 standard deviations for secure children. In contrast, for every standard deviation

increase in teacher-child conflict, child's negative engagement with peers decreased by .206 standard deviations for children with disorganized attachment.

In addition, the relationship between closeness in teacher-child relationships and child's negative engagement with peers was not significant for children with secure attachment (*ß* = .062, *p* = .223), but it was significant for children with disorganized attachment (*ß* = -.251, *p* = .009). For every standard deviation increase in teacher-child closeness, child's negative engagement with peers decreased by .251 standard deviations for children with disorganized attachment.

Table 3
Significance of the changes on Chi-square of pairwise parameter comparisons

	$\Delta\chi^2$	Δdf	*p*
Constrained Path for Research Question 5A			
Conflict in Teacher-child → Emotion Reactivity	.014	1	.970
Conflict in Teacher-child → Negative Engagement with Peers	3.215	1	.073
Conflict in Teacher-child → Negative Affect toward Teacher	1.254	1	.263
Closeness in Teacher-child → Emotion Reactivity	.409	1	.523
Closeness in Teacher-child → Negative Engagement with Peers	.954	1	.329
Closeness in Teacher-child → Negative Affect toward Teacher	2.968	1	.085
Constrained Path for Research Question 5B			
Conflict in Teacher-child → Emotion Reactivity	.226	1	.635
Conflict in Teacher-child → Negative Engagement with Peers	2.874	1	.090
Conflict in Teacher-child → Negative Affect toward Teacher	.038	1	.846
Closeness in Teacher-child → Emotion Reactivity	1.979	1	.160
Closeness in Teacher-child → Negative Engagement with Peers	.018	1	.892
Closeness in Teacher-child → Negative Affect toward Teacher	.033	1	.855
Constrained Path for Research Question 5C			
Conflict in Teacher-child → Emotion Reactivity	1.339	1	.247
Conflict in Teacher-child → Negative Engagement with Peers	13.098	1	**.000**
Conflict in Teacher-child → Negative Affect toward Teacher	.849	1	.357
Closeness in Teacher-child → Emotion Reactivity	.069	1	.793
Closeness in Teacher-child → Negative Engagement with Peers	7.942	1	**.005**
Closeness in Teacher-child → Negative Affect toward Teacher	.640	1	.424

CHAPTER 5: DISCUSSION

Overall Findings

The current quantitative study aimed to investigate the associations of mother-child attachment at 36 months, teacher-child relationships at 54 months and children's emotion regulation in 3rd grade. The mediation and moderation effects of teacher-child relationships on the associations between mother-child attachment and emotion regulation were also examined. Path analyses revealed that both ambivalent and disorganized attachment had a significant direct effect on teacher-child conflict. The direct effect between teacher-child conflict and negative engagement with peers was also significant. However, no evidence was found to support the impact of early mother-child attachment on a child's later emotion regulation. The mediation effect of teacher-child relationships on the associations between mother-child attachment and emotion regulation was not found either. Nevertheless, moderation analyses showed that for children with disorganized attachment, the effects of conflict and closeness in teacher-child relationships on child's negative engagement with peers were significantly different from those for children with secure attachment.

Findings by Research Questions

Early Mother-child Attachment and Later Teacher-child Relationships

The first research question investigated the effect of mother-child attachment at 36 months on conflict and closeness in teacher-child relationships at 54 months. It was found that children with ambivalent and with disorganized attachment patterns had significantly higher levels of teacher-child conflict than those with secure attachment. A trend that

children with disorganized attachment have lower levels of closeness than children with secure attachment was found. However, this trend was not statistically significant. These findings are partially consistent with previous theories and studies. One central hypothesis of Bowlby's (1982) attachment theory is that early attachment experiences shape children's cognitive representations of how they view themselves, others and interpersonal interactions. Hence, these experiences serve as relational frameworks, and have great impact on children's development of interpersonal relationships. Children with secure attachment tend to have higher levels of positive teacher-child relationships than those with insecure attachment patterns (Davis, 2003; Verís simo et al. 2017). The association of early attachment patterns does not only exist in children's toddlerhood, but also persists into preschool (Sabol et al., 2012). For example, by measuring 4 to 5-year-old children's representations of attachment, Verís simo and colleagues (2017) found a significant association of attachment security and positive teacher-child relationships.

However, in line with the current study, a longitudinal study using data from the first two phases of NICHD SECCYD, conducted by O'Connor and McCartney (2006) found that for attachment measured at 36 months, only disorganized attachment was negatively associated with the quality of teacher relationships at 54 months, kindergarten, and 1st grade. However, they also found a negative association of avoidant attachment measured at 15 months with the quality of the teacher-child relationship, which is not the case in this study. This inconsistence might due to the fact that only 3. 5% of the children in the study were classified with avoidant attachment, while 63. 5 % were classified as being securely attached.

In another study, O'Connor and colleagues (2012) used the data from the first three phases of the NICHD SECCYD and assessed the conflict and closeness trajectories for teacher-child relationships. They also found that, as compared to children with secure attachment, only children with disorganized attachment were more likely to experience increased teacher-child conflict and low levels of teacher-child closeness from 54 months through fifth grade. The findings of the current study partially supported the tenets of attachment theory, and indicate that both children with disorganized and with ambivalent attachment patterns have difficulties in building positive teacher-child relationship.

One possible explanation for the statistically insignificant effects of early mother-child relationships on later teacher-child relationships is that teacher-child relationships are more transactional (Stuhlman & Pianta, 2001). According to Developmental Systems Theory, the quality of teacher-child relationships is determined by characteristics of the child and the teacher as well as other environmental factors (Verschueren, 2015). For example, Ver ssimo and colleagues (2017) showed that children's verbal ability together with their attachment security influenced the co-construction of a positive and close teacher-child relationship. Birch & Ladd (1998) found that children's behavioral orientations predicted their 1st grade teacher-child relationships. Hence, children's attachment history is only one of the many factors that can influence their relationships with their teachers. Moreover, Sabol and colleagues (2011) claimed that teacher's sensitivity is one major factor influencing the construction of a high quality teach-child relationship, which may also act as a moderator in the association of parent-child and teacher-child relationship. The findings that teacher sensitivity protected less securely attached children against the risk of less positive

teacher-child relationship (Buyse, Verschueren & Doumen, 2011) may explain the statistically insignificant associations of the attachment patterns with conflict and closeness in teacher-child relationship in the current study.

Early Mother-child Attachment and Later Emotion Regulation

The second research question investigated the effect of mother-child attachment at 36 months on children's emotion regulation in 3rd grade. With the demographic variables taken into account, no evidence was found to support the linkage between early mother-child attachment patterns and child's later emotion regulation. In addition, the fourth research question investigating the mediational role of teacher-child relationships at 54 months on the linkage between early mother-child attachment and emotion regulation was built on research question 2. According to Baron and Kenny (1986), a significant effect of the early mother-child attachment on the later emotion regulation is the first requirement for the mediation analysis. Therefore, no evidence was gained to support the mediational role of teacher-child relationships in the present study. In addition, no statistically significant indirect effect of early mother-child attachment on emotion regulation was found in the present study. These results were inconsistent with what researchers have suggested (e.g. Verschuerena & Koomen, 2012).

Researchers have claimed that children's early attachment patterns have enduring impacts on emotion regulation throughout their lifespan (e.g. Bowlby 1982; Brumariu, 2015; Mikulincer & Shaver, 2019; Zimmer-Gembeck et al., 2017). Brumariu (2015) found that children with secure attachment history showed higher levels of emotion regulation in both typical and challenging circumstances. The effects of attachment patterns on children's

emotion regulation were not only found to be evident in preschool years but also in middle childhood. For example, Zimmer-Gembeck and colleagues' (2017) review showed that 14 studies focused on preschool year children and 5 studies investigated elementary school year children provided some evidence for the association of attachment with emotion regulation. However, the 5 studies investigating elementary school year children only reported cross-sectional associations of attachment and emotion regulation. The current study adopted a longitudinal research design to investigate the associations of early mother-child attachment and later emotion regulation. This might be one of the reasons why the findings in the current study are inconsistent with the previous studies. The incongruent findings of this study with those conducted previously may also partially be due to the unbalanced number of children in the four attachment groups. The majority of the participants included in this study were securely attached, while only 3. 5% were classified with avoidant attachment, 16. 3% were classified with ambivalent attachment, and 16. 7% were classified with disorganized attachment.

Another possible reason as to why no significant association was found between early mother-child attachment and later emotion regulation in the current study might be related to the measurements of emotion regulation used in this study. Zimmer-Gembeck and colleagues (2017) argued that the measurement of emotion regulation may affect the observed associations of attachment with emotion regulation. Zimmer-Gembeck and colleagues (2017) further stated that the associations of attachment and emotion regulation might be complicated, and that children with different attachment patterns may have emotion regulation difficulties in different aspects. Emotion regulation is a rather complex construct,

which involves various processes and components (Gross, 2014; Morris et al. , 2007; Thompson1994). In the current study, parents' report of children's emotional reactivity, and children's negative affect toward teacher and negative engagement with peers observed in classroom were used as three indicators of children's emotion regulation. In contrast, studies which assessed specific emotion regulation strategies and assessed emotion regulation as a broad construct showed some significant associations between attachment and emotion regulation (Brumariu, 2015).

Teacher-child Relationships and Later Emotion Regulation

The third research question investigated the effects of conflict and closeness in teacher-child relationships at 54 months on children's emotion regulation in 3rd grade. Path analyses only found one significant direct effect of teacher-child relationship on children's emotion regulation. Specifically, children who had higher levels of teacher-child conflict at 54 months also had significantly higher levels of negative engagement with peers in 3rd grade. This finding is consistent with what was hypothesized. Although little longitudinal research has been conducted to examine teachers' roles in influencing children's emotion regulation development, many researchers have suggested that early teacher-child relationships could predict children's emotion regulation (e.g. Birch & Ladd, 1997; Burchinal eta. 2001; O'Connor & McCartney, 2007; Pianta, 1994; Pianta & Stuhlman, 2004). In one cross-sectional study, using the Emotion Regulation Checklist to assess children's emotion regulation, both student–teacher closeness and conflict significantly correlated with children's emotion regulation, but in opposite directions (Pallini et al., 2019).

In addition, emotion regulation is connected to the development of social-emotional, behavioral and cognitive functions over time (Denham, 1998; Eisenberg et al., 2005; Garnefski et al., 2007). Previous studies have shown that teacher-child relationships have great influence on children's social adjustment, school functioning and behavioral problems (e.g. Birch & Ladd, 1997; Pianta & Nimetz, 1991; Pianta et al, 1997; O'Connor & McCartney, 2007; O'Connor et al., 2012; McCormick et al. 2017). These findings can be used to explain the associations of teacher-child relationships with children's emotion regulation. Specifically, higher levels of conflict in teacher-child relationships have been found to correlate with higher levels of behavioral and learning problems, and with lower levels of social competence and grade retention (Pianta & Sternberg, 1992; Pianta & Stuhlman, 2004; Pianta et al., 2005).

Although no significant effect of teacher-child closeness on children's emotion regulation variables was found in the present study, previous studies have shown that teacher-child closeness has been positively related to children's academic achievement, school liking, and overall school adjustment (Birch & Ladd, 1997; Burchinal et al. , 2002; Pianta & Stuhlman, 2004; Pianta et al. , 2005). In addition, it was surprising to note that neither teacher-child closeness nor teacher-child conflict significantly predicted children's negative affect towards their teacher. A longitudinal study conducted by Pianta & Stuhlman (2004) revealed moderate correlations among teacher's ratings of conflict through preschool to 1st grade, and slightly lower correlations among teacher's ratings of closeness. However, Verschueren (2015) argued that when children entered into middle childhood, they would spend less time with their teacher individually, and thus the influences of teach-child

relationships may decrease. Research has also shown significant non-linear decreases in teacher-child closeness, and increases in teacher-child conflict from kindergarten to sixth grade (Jerome, Hamre, & Pianta, 2009). Hence, the findings in this study can be considered as being partially consistent with the previous literature.

This study established a rather rigorous model for the associations between teacher-child relationships at 54 months and children's emotion regulation in 3rd grade, by controlling for demographic variables, attachment patterns at 36 months, and effortful control at 54 months. Therefore, the finding of a significant linkage between teacher-child conflict at 54th months and children's emotion regulation in 3rd grade is rather meaningful, and should be taken into consideration by school teachers in their daily practices. The present study also fills in the research gap with regard to the effects of preschool year teacher-child relationships on children's emotion regulation in middle childhood.

Moderation Role of Teacher-child Relationships

The fifth research question investigated the moderation effect of teacher-child relationships at 54 months on the linkage between early mother-child attachment at 36 months and emotion regulation in 3rd grade. Multi-group analyses revealed two significant moderation pathways. First, teacher-child conflict negatively predicted children's negative engagement with peers for children with disorganized attachment, while teacher-child conflict showed a positive association with children's negative engagement with peers for children with secure attachment. This negative association of teacher-child conflict with child's negative engagement with peers for disorganized children is in the opposite direction of what was expected. However, Granqvist and collegues (2017) argued that disorganized

attachment with certain caregivers does not necessarily predict later social and behavioral problems. It is also interesting to note that for secure children, teacher-child conflict at 54th months positively predicted their negative engagement with peers in 3rd grade. These findings support the idea that there might be distinct relational schemas for different caregivers that the child attaches to (Davis, 2003; Levy, Blatt, & Shaver, 1998). Therefore, even for securely attached children, teacher-child conflict may lead to emotion regulation problems. It is also entirely possible, that there is another variable that was not measured or included in the present study that accounted for this surprising finding.

Secondly, teacher-child closeness significantly predicted children's negative engagement with peers for children with disorganized attachment, but not for children with secure attachment. For children with disorganized attachment, teacher-child closeness was negatively correlated with children's negative engagement with peers. It is interesting to note that, without considering this moderation effect, neither mother-child attachment patterns nor teacher-child significantly predicted children's emotion regulation in general. These findings are in line with previous findings that teacher-child closeness may compensate for children's negative parent-child experiences (Hughes et al., 1999). Research in the field of behavioral adjustment problems has also revealed this protective role of teacher-child closeness against risk factors (Sabol & Pianta, 2012). Close teacher-child relationships may provide children opportunities to experience security (Davis, 2003), and hence promote positive relationships for children at risk (Sabol & Pianta, 2012). The present study advances the understanding of the associations of early mother-child attachment patterns and children's emotion regulation in middle childhood. Children's experiences of positive

teacher-child relationships may serve as a protective factor for the negative effects of early mother-child attachment on emotion regulation development.

In fact, training teachers from a relational perspective to promote their sensitivity to students and interpersonal skills has been found to be beneficial for improving teacher-child relationships, and ultimately for improving children's school and behavioral adjustment (Driscoll,Wang, Mashburn, & Pianta, 2011; Sabol & Pianta, 2012;). For example, Driscoll and colleagues (2011) found that teachers trained with Banking Time constructed greater relational closeness with children who had more behavioral problems. In addition, a relationship-focused reflection program, based on attachment theory and Pianta's ideas of teacher consultation, has been found to be effective in improving relationships between teachers and behaviorally at-risk kindergartners (Spilt, Koomen, Thijs, & van der Leij, 2012). Moreover, Vancraeyveldt and colleagues (2015) showed that implementing the Playing-2-gether intervention, which is based on attachment and learning theory, resulted in significant decreases in teacher-child conflict and preschoolers' externalizing problem behavior.

Suggestions for Further Research

The present study aimed to examine the mechanisms by which mother-child attachment patterns and teacher-child relationships in preschool years influence children's emotion regulation in middle childhood. However, many of the hypothesized pathways were not found to be significant. To further investigate these pathways in future studies, several suggestions are offered. The first suggestion has to do with the ratio between secure and insecure children in the sample population. When recruiting the participants, it is better

to have an almost equal number of children in each of the four attachment groups, so the differences between the secure group and insecure groups can be compared more validly. It is recognized that attachment patterns are impossible to determine a priori, but perhaps better sampling and recruitment of families might yield a more balanced representation of attachment groups. Targeting groups known to have more risk factors, along with those known to have fewer, may also serve to insure adequate representation of the four groups.

Secondly, parents' reports of child's emotion reactivity together with in-class behavioral observation of negative affect toward teacher and negative engagement with peers were used to measure children's emotion regulation in the present study. However, emotion regulation as a rather complex construct involves various processes and components (Gross, 2014; Morris et al., 2007; Thompson1994). To better capture the nature of the associations between mother-child attachment and emotion regulation, as well as the mechanisms by which teacher-child relationships may influence children's emotion regulation, research in the future should utilize multi-method measurements capturing various aspects of children's emotion regulation. For example, Zimmer-Gembeck and colleagues (2017) pointed out that assessing both the behavioral aspects and the physiological indicators of emotion regulation can provide a more in-depth understanding of the associations between attachment and emotion regulation.

Thirdly, this study only compared securely attached children with insecurely attached children in the analyses of the associations of mother-child attachment and teacher-child relationships with children's emotion regulation. Brumariu (2015) suggested that insecure attachment patterns might have different relationships with children's emotion regulation.

Therefore, further research needs to be conducted to reveal the unique associations between all four attachment patterns and various aspects of children's emotion regulation.

Conclusion

The current study adopted an attachment perspective to investigate how mother-child attachment at 36 months and teacher-child relationships at 54 months influenced children's emotion regulation in 3rd grade, after accounting for mother's education, family income, child's gender and child's effortful control. The findings suggest that, as compared to children with secure attachment, children with ambivalent and with disorganized attachment show higher levels of teacher-child conflict. Further, the extent of teacher-child conflict significantly predicted their later levels of negative engagement with peers. Moreover, the effects of conflict and closeness in teacher-child relationships on later emotion regulation for children with disorganized attachment are different from the effects for children with secure attachment. Early mother-child attachment was not found to have a direct association with child's later emotion regulation. Research is needed to further investigate the mechanisms by which early mother-child attachment may influence children's emotion regulation in middle childhood, using various measurements of emotion regulation.

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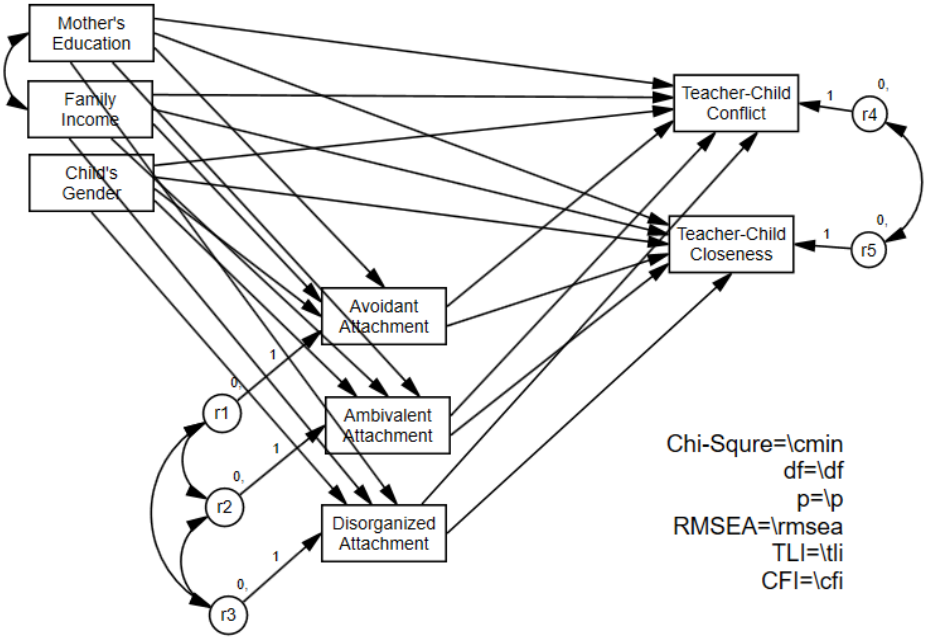
APPENDIX A: HYPOTHESIZED PATH MODEL FOR THE FIVE RESEARCH QUESTIONS



*Figur*e 1. Hypothesized path model for research question one.

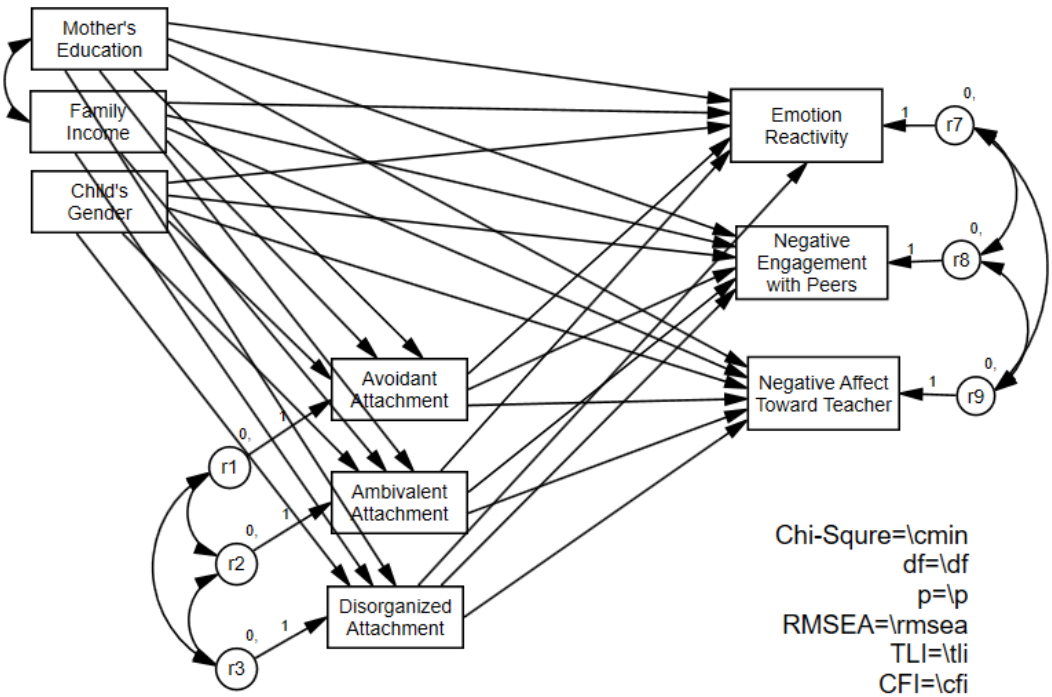


Figure 2. Hypothesized path model for research question two.

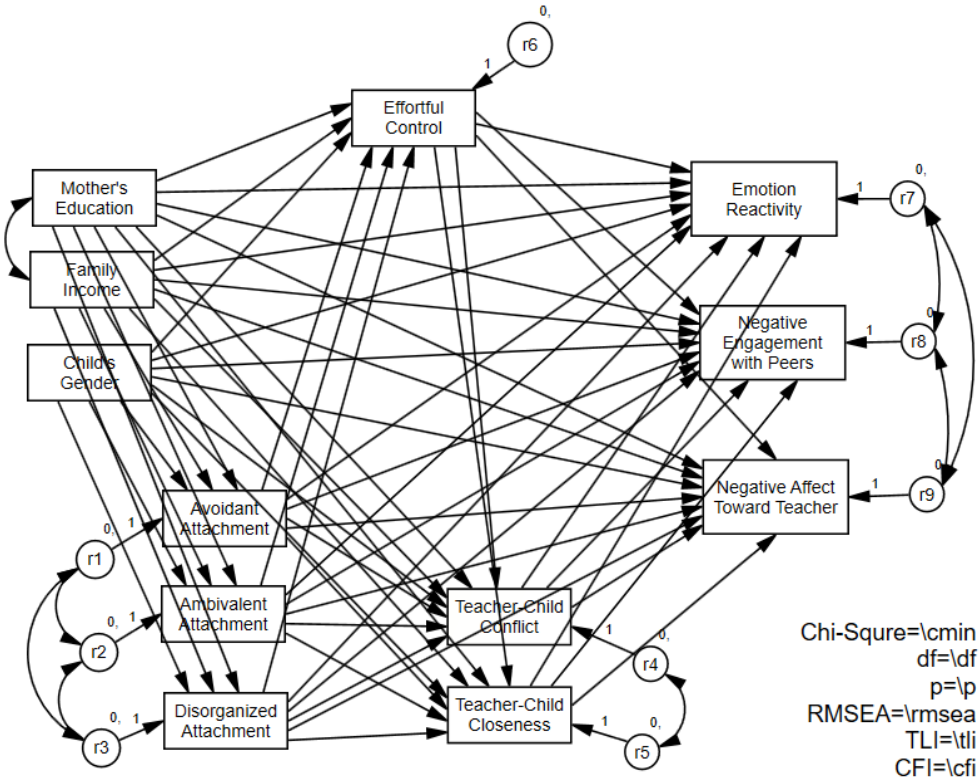


Figure 3. Hypothesized path model for research questions three and four.

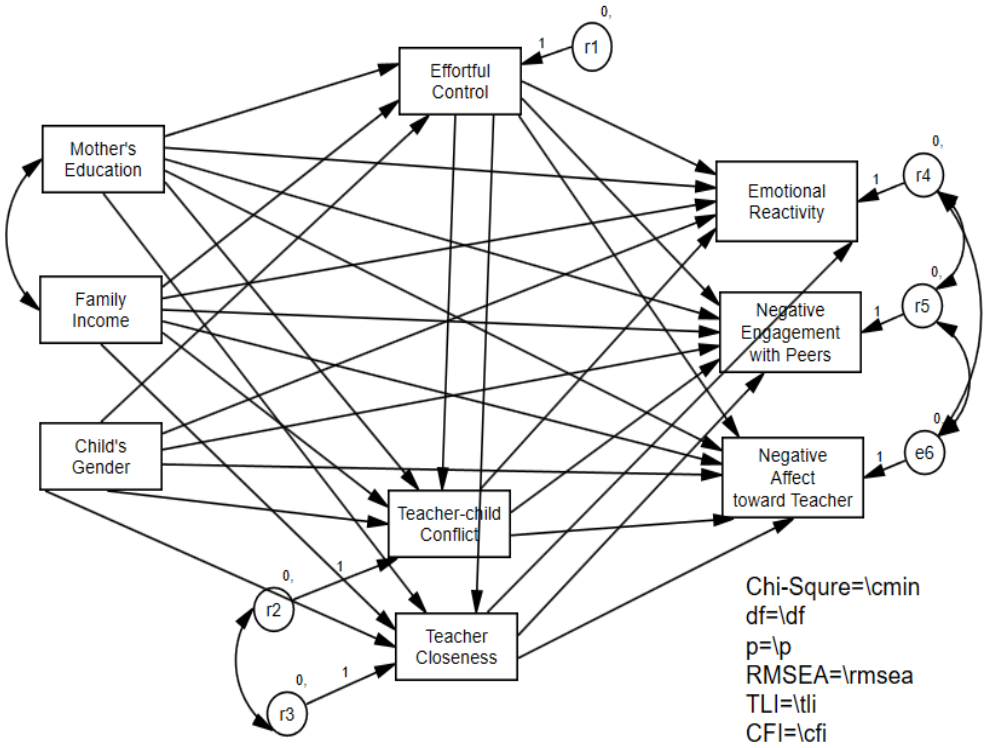


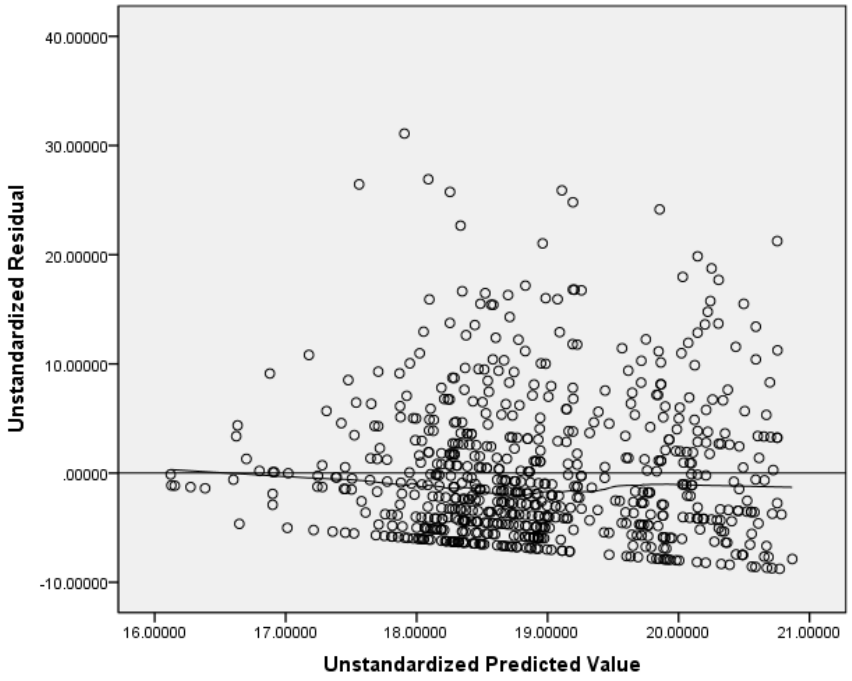
Figure 4. Hypothesized path model for research question five.

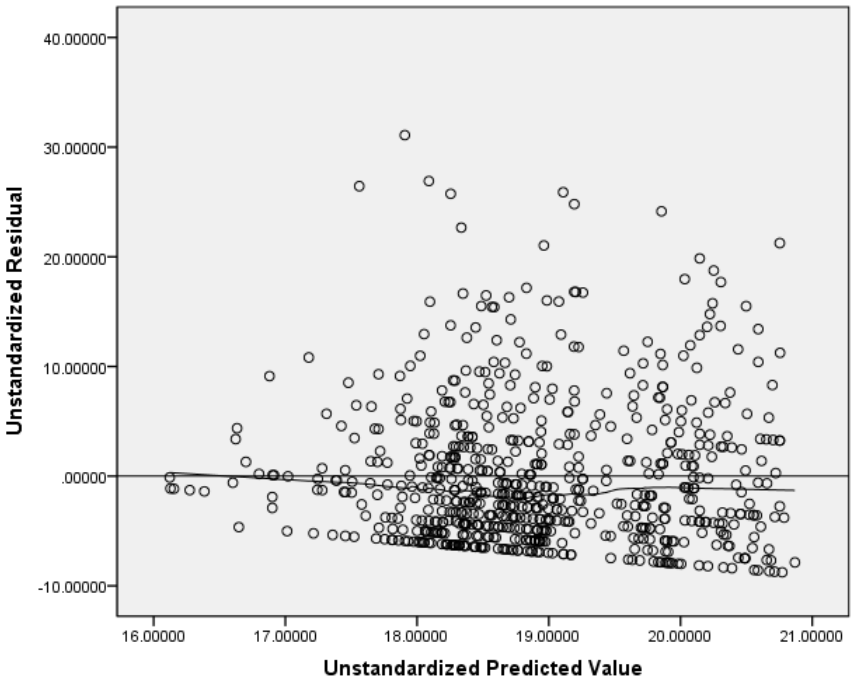
Note. Mother-child attachment is the multi-group variable, which is not shown in the above model.

APPENDIX B: EXAMINATION OF STATISTICAL ASSUMPTIONS OF RESEARCH QUESTION ONE

Dependent variables are conflict and closeness in teacher-child relationships.

Linearity Assumption: Unstandardized Residuals Plotted Against Outcome Variables

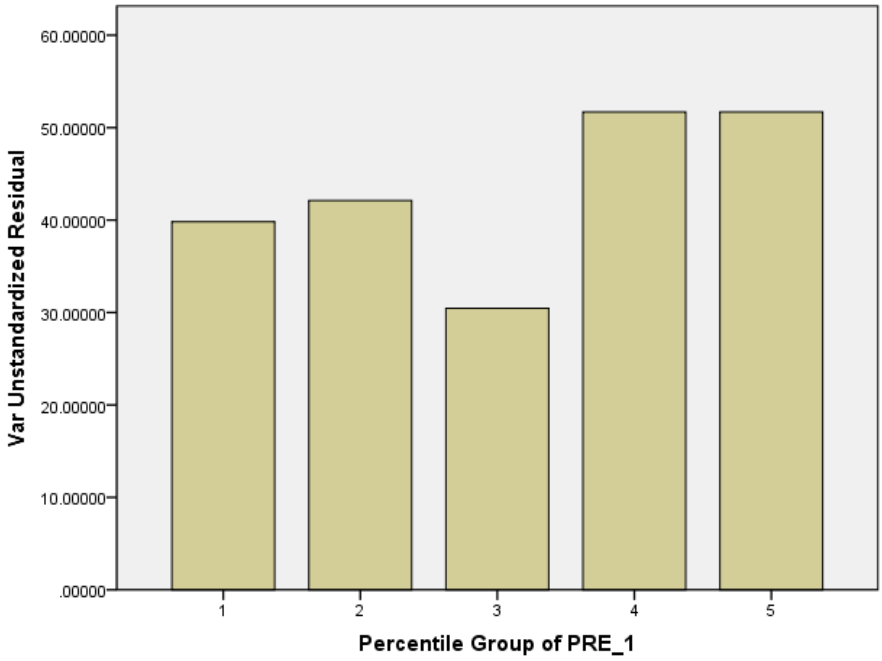




Multicollinearity Assumption: Tolerance and VIF

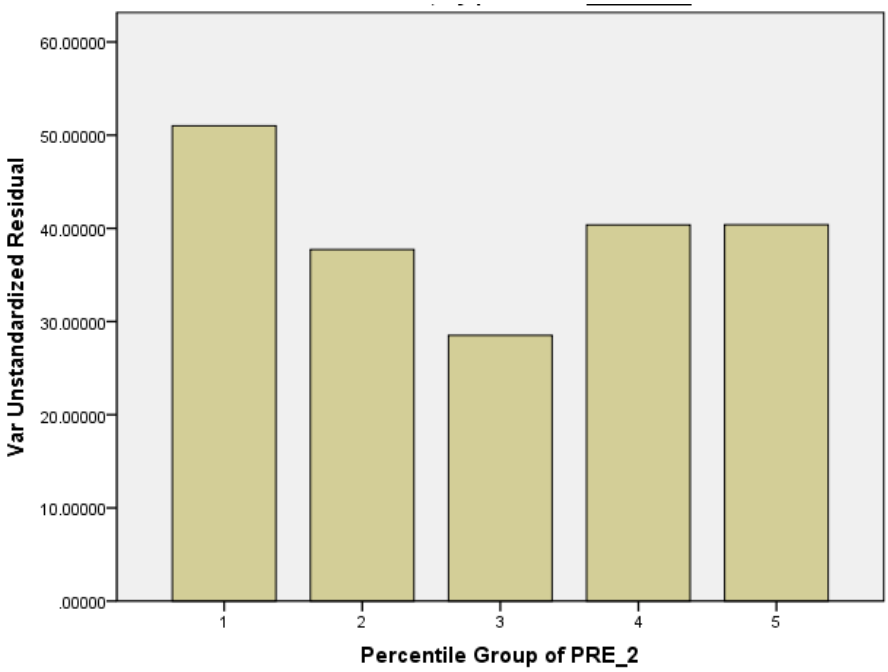
	Tolerance	VIF
Effect on Conflict and Closeness in Teacher-child Relationships		
Child's Gender	.989	1.011
Mother's Education	.748	1.336
Family Income	.758	1.319
Avoidant Attachment	.980	1.020
Ambivalent Attachment	.935	1.070
Disorganized Attachment	.937	1.067

Homoscedasticity Assumption: Variance of Residuals



Unstandardized Residual

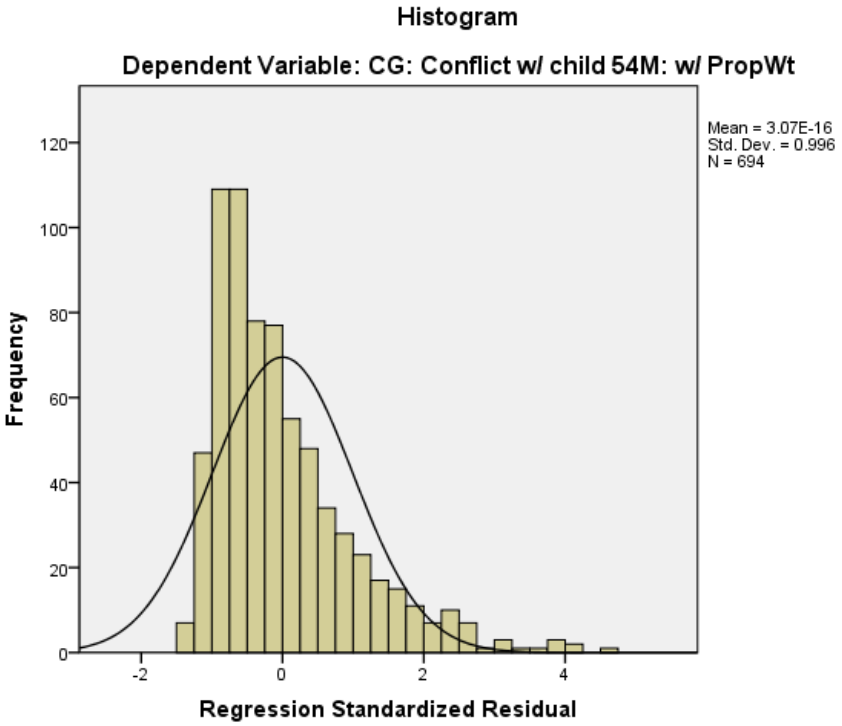
Percentile Group of PRE_1	Mean	N	Std. Deviation	Variance
1	.1565816	139	6.30983959	39.814
2	.1909643	138	6.49008889	42.121
3	-1.1112426	139	5.51864348	30.455
4	.6081846	139	7.19015541	51.698
5	.1568859	139	7.18920350	51.685
Total	.0000000	694	6.57617988	43.246

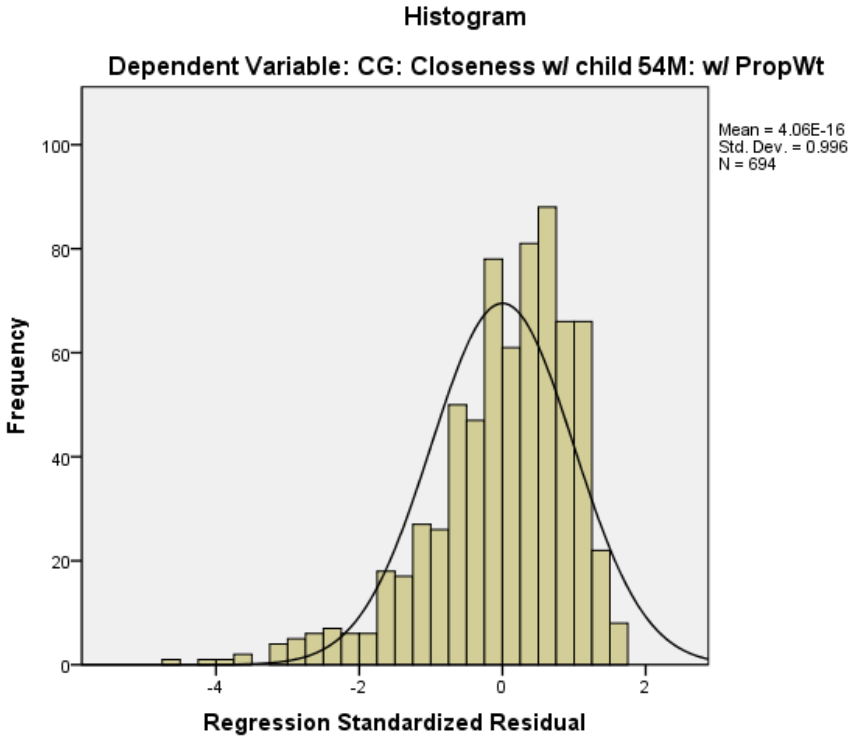


Unstandardized Residual

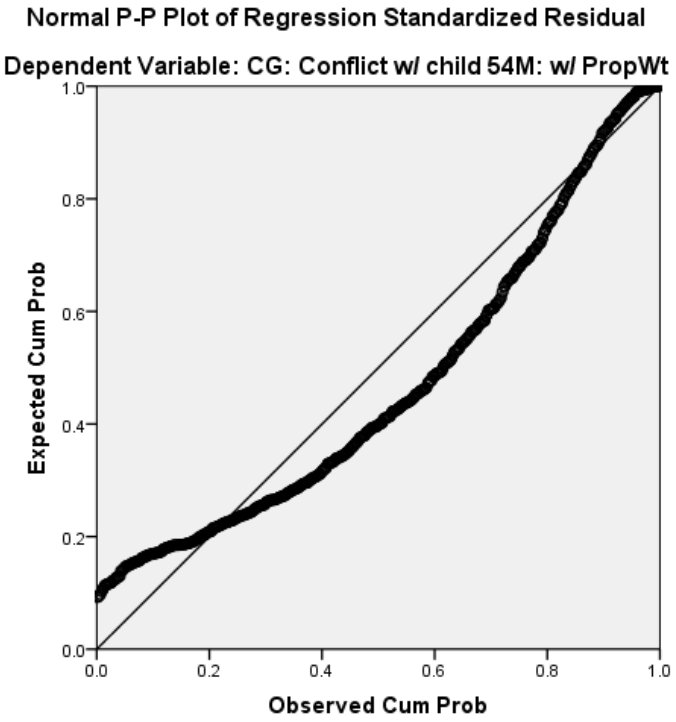
Percentile Group of PRE_2	Mean	N	Std. Deviation	Variance
1	.8412110	138	7.64537909	58.452
2	-.1571396	139	6.39930295	40.951
3	-1.1467090	139	5.52805002	30.559
4	.2005394	139	6.47994762	41.990
5	.2681501	139	6.59337073	43.473
Total	.0000000	694	6.57617988	43.246

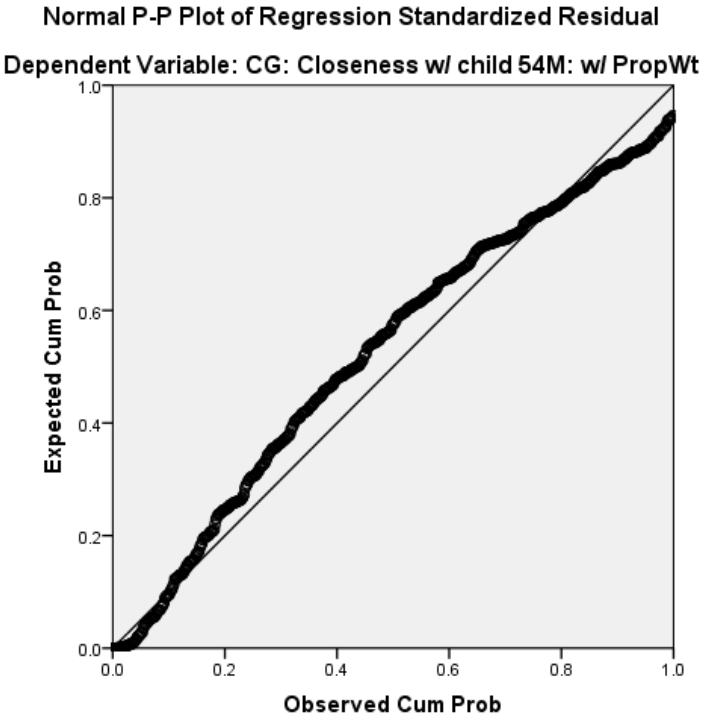
Normality of Residuals Assumption: Histogram





Normality of Residuals Assumption: P-P Plot

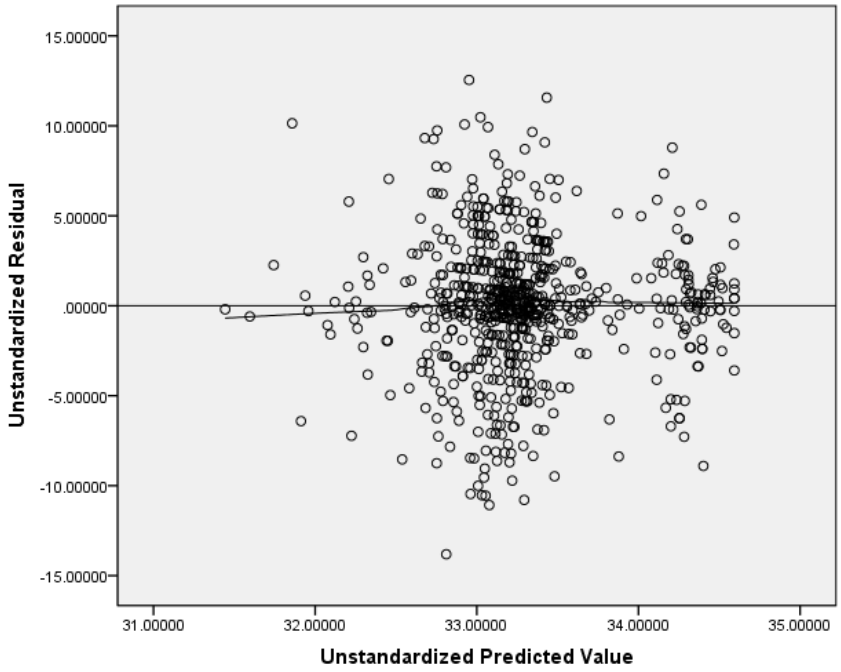


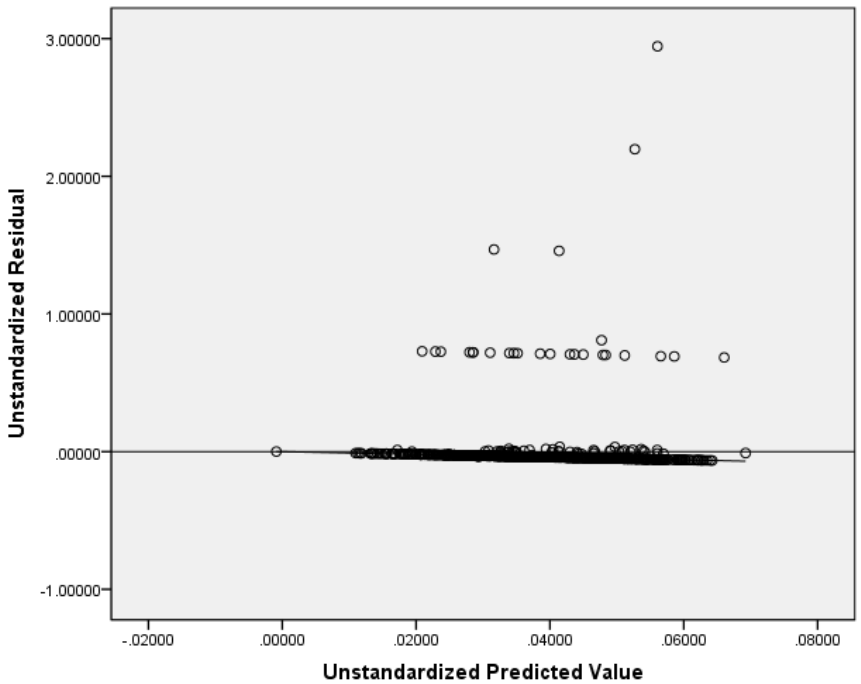


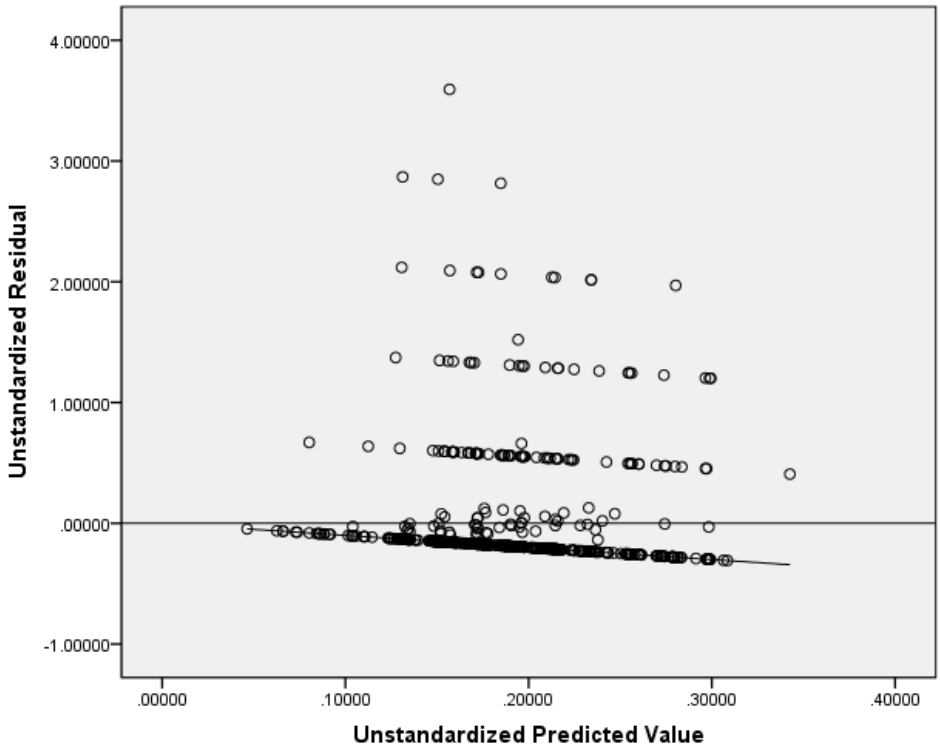
APPENDIX C: EXAMINATION OF STATISTICAL ASSUMPTIONS OF RESEARCH QUESTION TWO

Dependent variables are child's emotion reactivity, negative affect toward teacher and negative engagement with peers.

Linearity Assumption: Unstandardized Residuals Plotted Against Outcome Variables



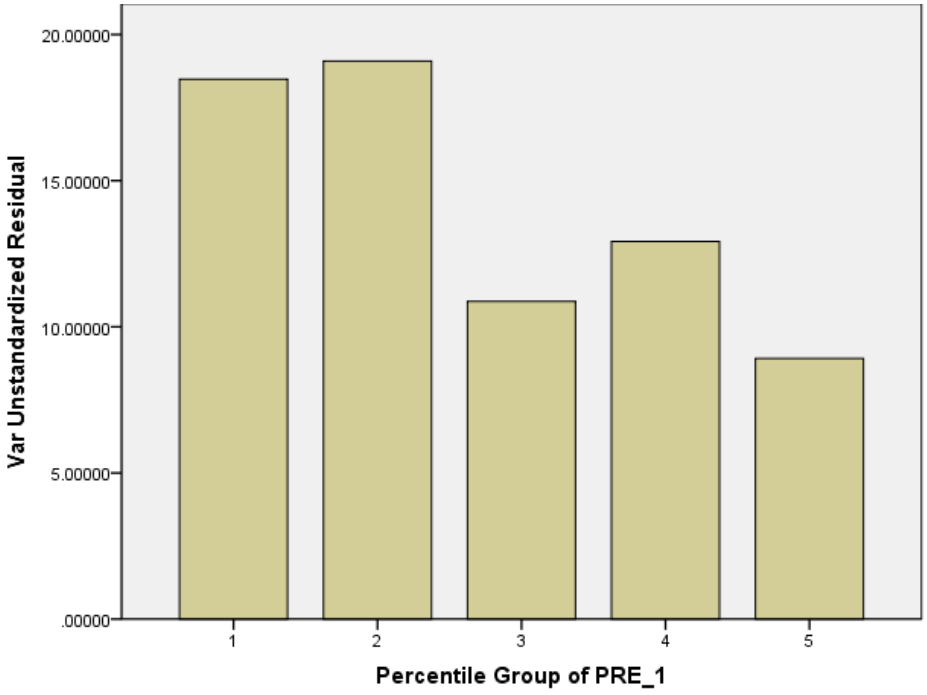




Multicollinearity Assumption: Tolerance and VIF

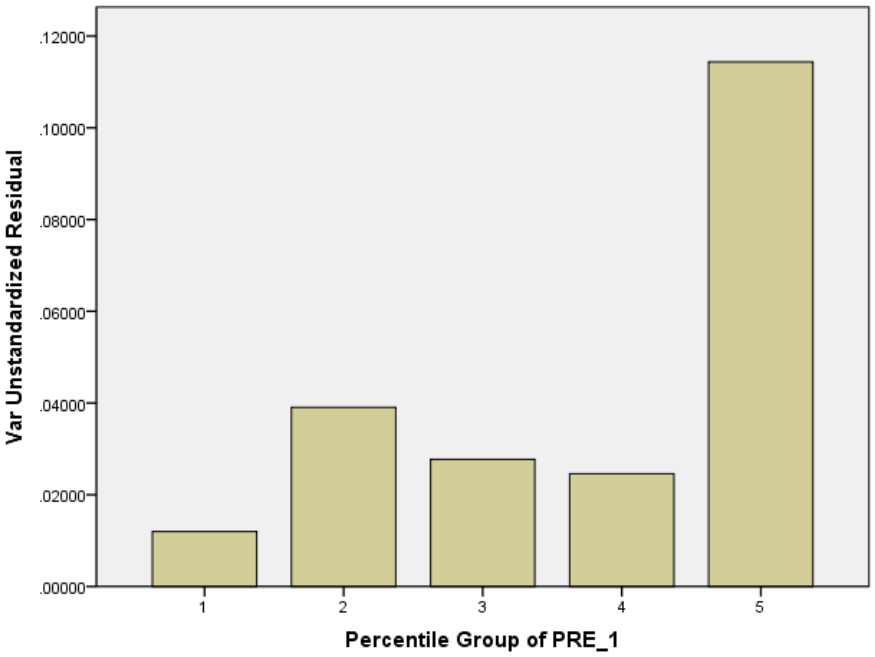
	Tolerance	VIF
Effects on Child's Emotion Reactivity, Negative Affect toward Teacher and Negative Engagement with Peers		
Child's Gender	.989	1.011
Mother's Education	.748	1.336
Family Income	.758	1.319
Avoidant Attachment	.980	1.020
Ambivalent Attachment	.935	1.070
Disorganized Attachment	.937	1.067

Homoscedasticity Assumption: Variance of Residuals



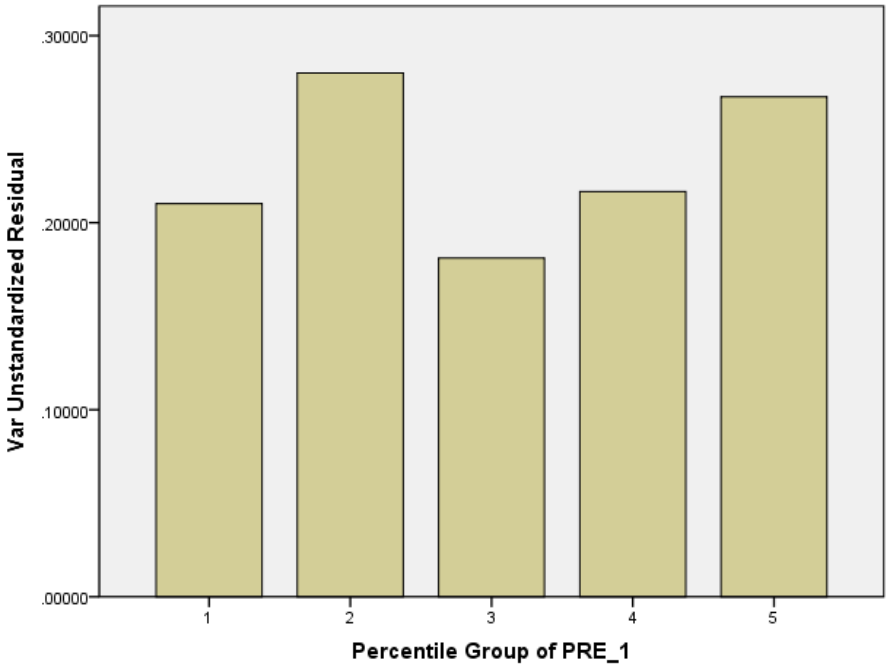
Unstandardized Residual

Percentile Group of PRE_1	Mean	N	Std. Deviation	Variance
1	-.0367828	138	4.29823845	18.475
2	.0041775	139	4.36943824	19.092
3	-.1967490	140	3.29654838	10.867
4	.2610645	138	3.59460413	12.921
5	-.0286812	139	2.98637983	8.918
Total	.0000000	694	3.73980049	13.986



Unstandardized Residual

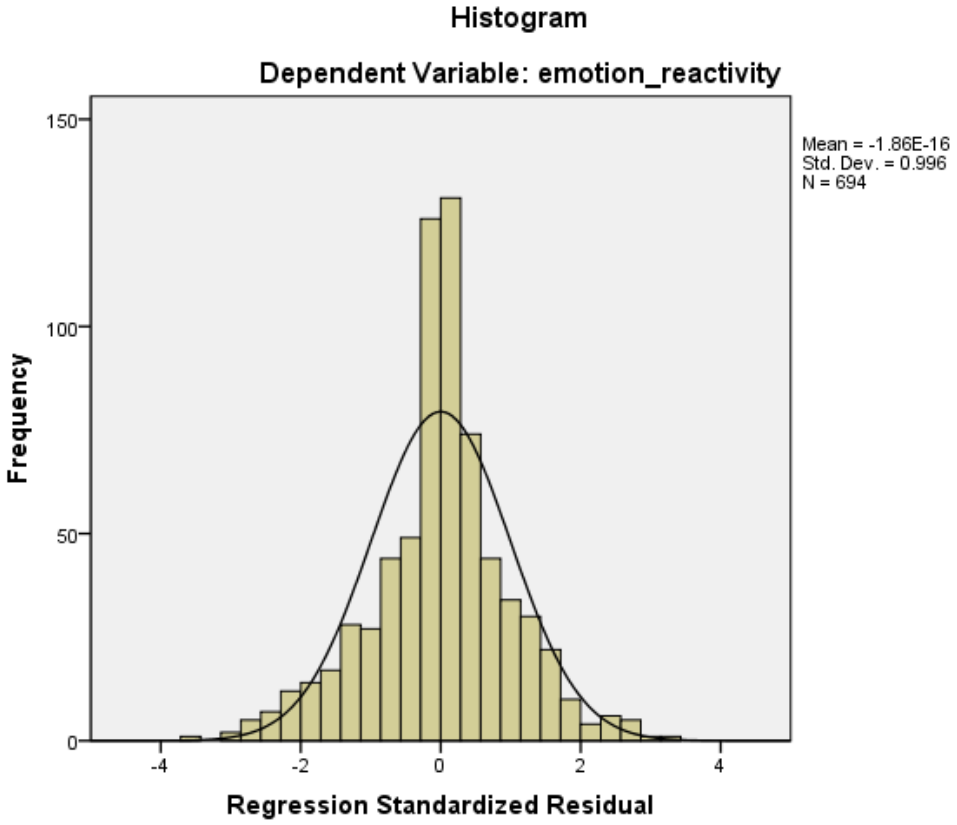
Percentile Group of PRE_1	Mean	N	Std. Deviation	Variance
1	-.0054921	139	.10941947	.012
2	.0147993	138	.19758954	.039
3	-.0075784	139	.16647414	.028
4	-.0095080	139	.15677885	.025
5	.0078856	139	.33819422	.114
Total	.0000000	694	.20828717	.043

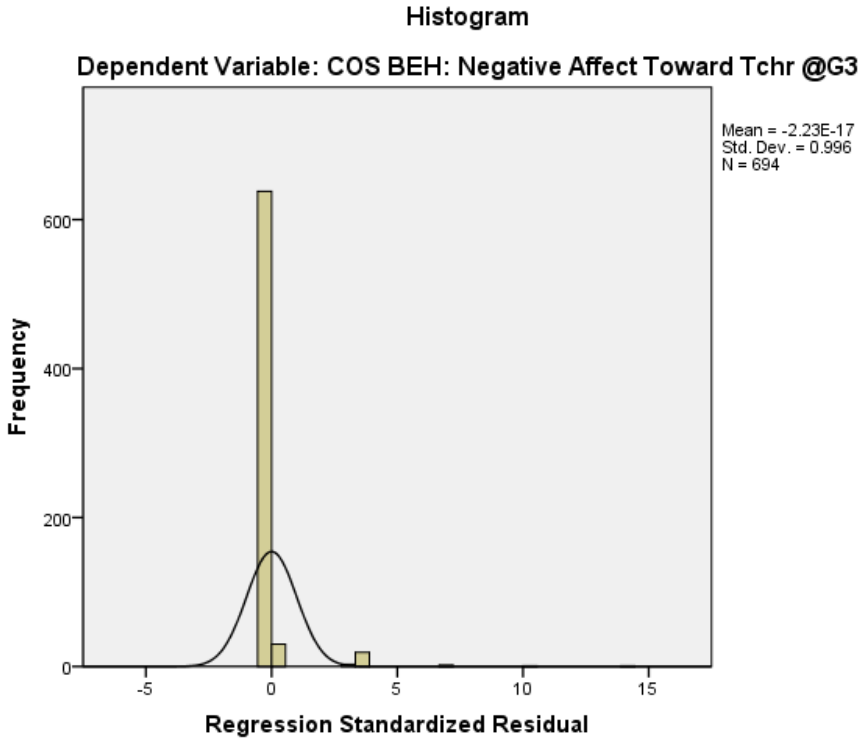


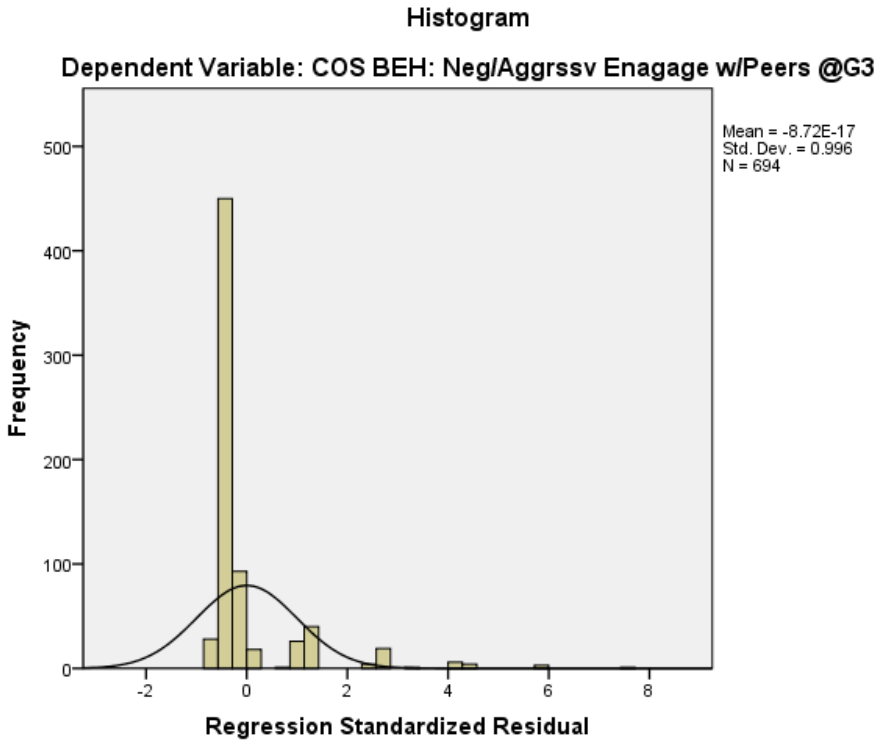
Unstandardized Residual

Percentile Group of PRE_1	Mean	N	Std. Deviation	Variance
1	-.0138200	137	.45848729	.210
2	.0495690	140	.52913409	.280
3	-.0528325	139	.42548654	.181
4	.0088030	139	.46546025	.217
5	.0077250	139	.51703375	.267
Total	.0000000	694	.48058357	.231

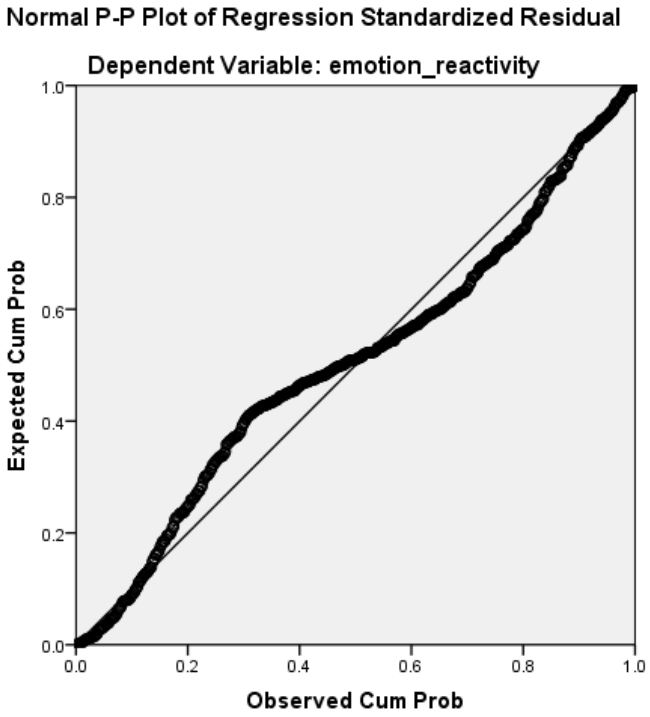
Normality of Residuals Assumption: Histogram

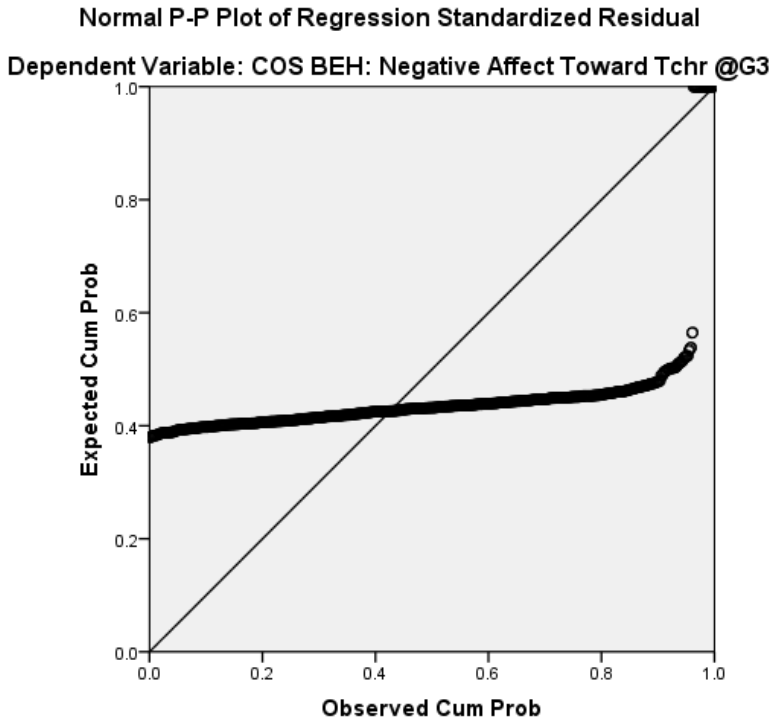


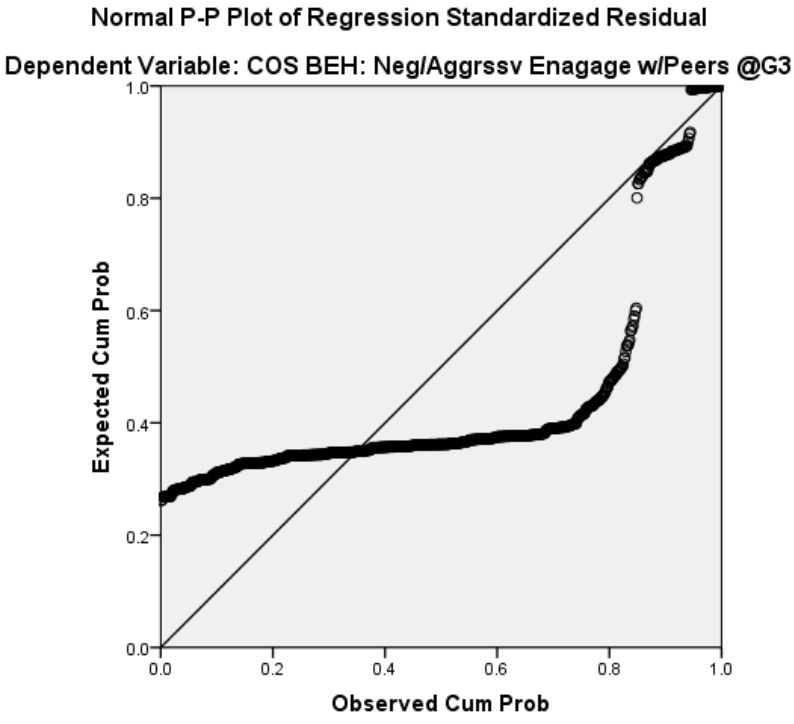




Normality of Residuals Assumption: P-P Plot



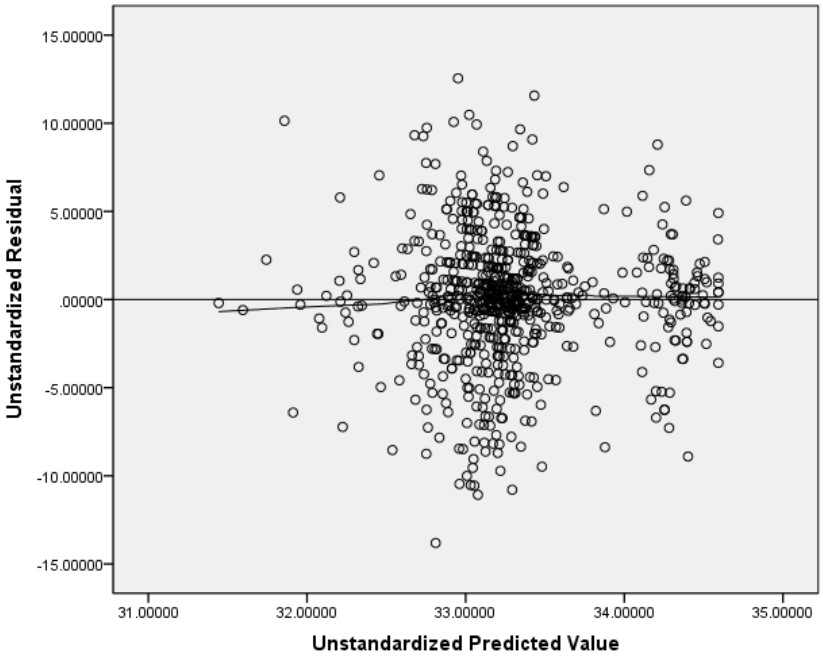

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: COS BEH: Negative Affect Toward Tchr @G3
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

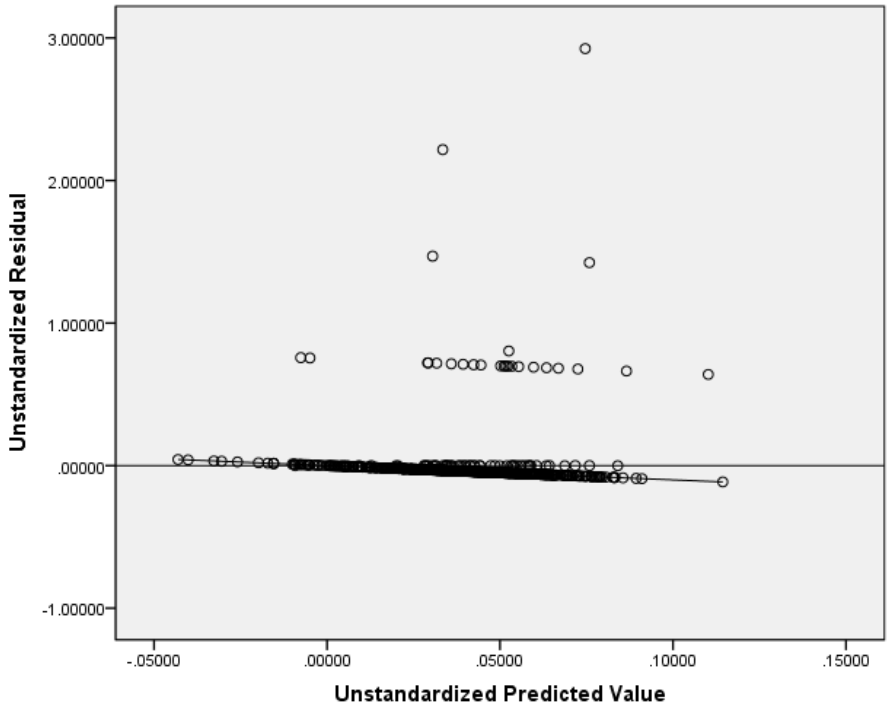

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: COS BEH: Neg/Aggrssv Enagage w/Peers @G3
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

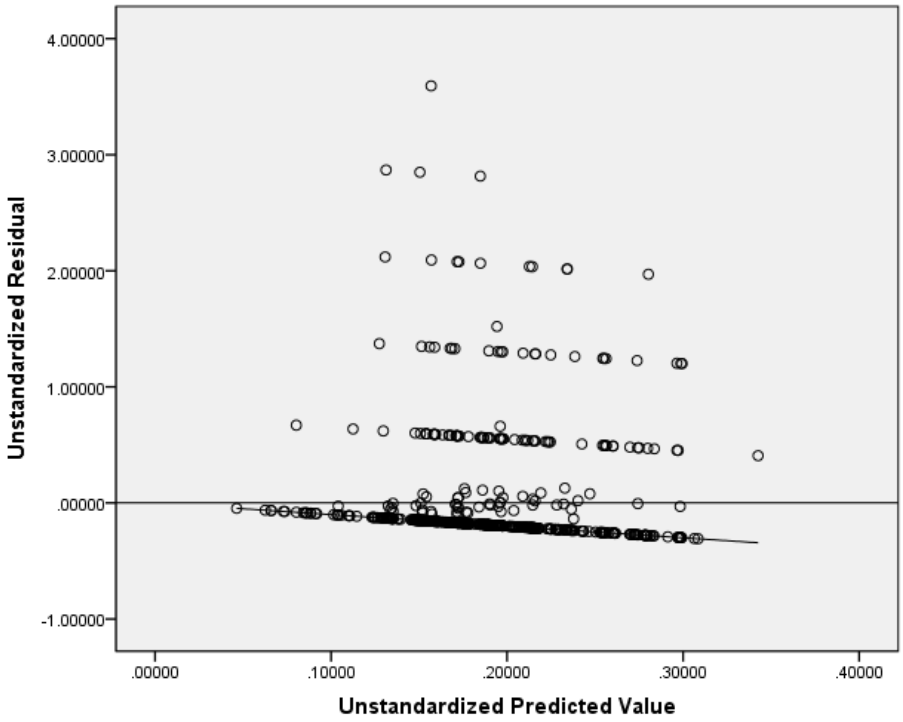
APPENDIX D: EXAMINATION OF STATISTICAL ASSUMPTIONS OF RESEARCH QUESTIONS THREE, FOUR AND FIVE

Dependent variables are child's emotion reactivity, negative affect toward teacher and negative engagement with peers.

Linearity Assumption: Unstandardized Residuals Plotted Against Outcome Variables



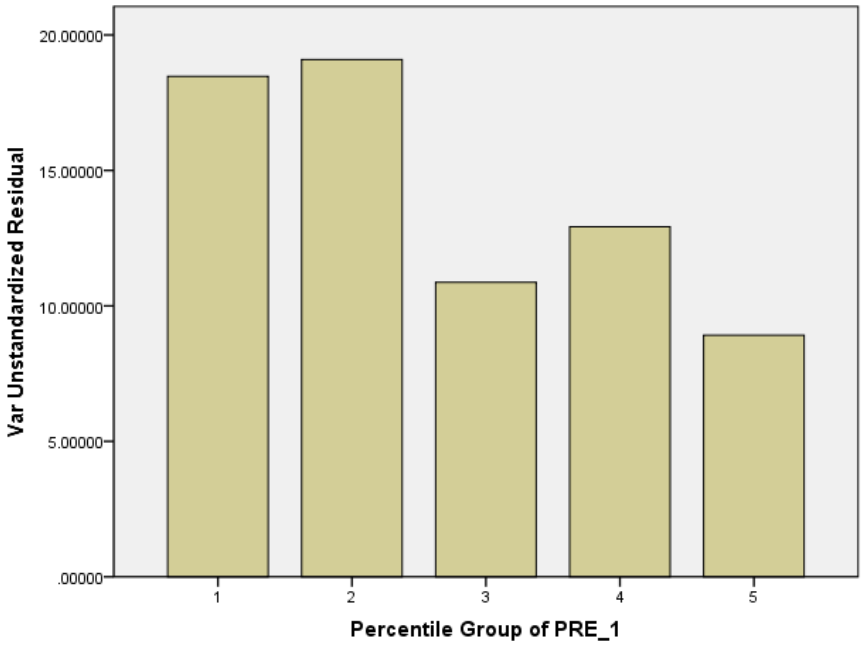

3.00000
2.00000
1.00000
.00000
-1.00000
Unstandardized Residual
-.05000
.00000
.05000
.10000
.15000
Unstandardized Predicted Value


4.00000
3.00000
2.00000
1.00000
.00000
-1.00000
Unstandardized Residual
.00000
.10000
.20000
.30000
.40000
Unstandardized Predicted Value

Multicollinearity Assumption: Tolerance and VIF

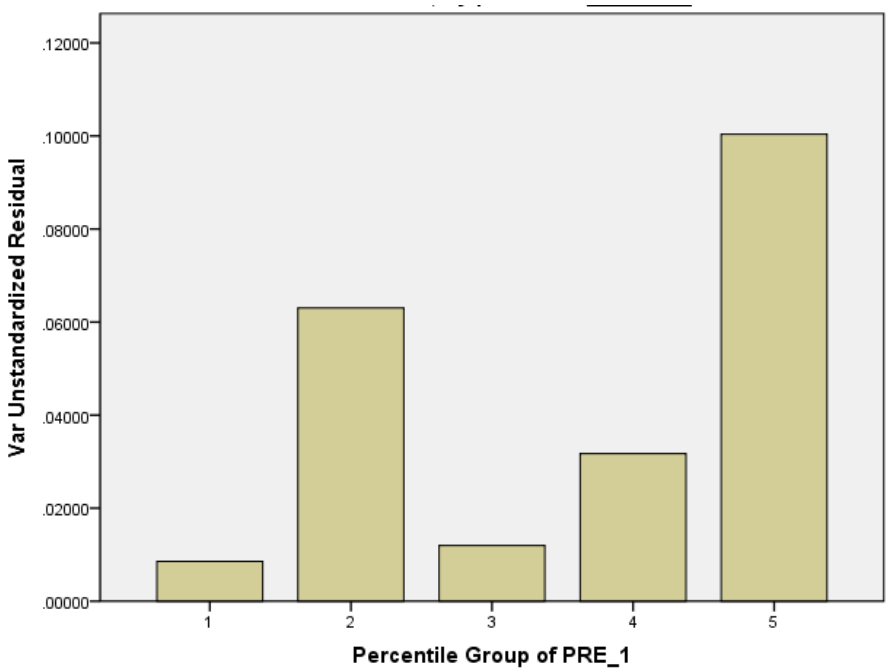
	Tolerance	VIF
Effects on Child's Emotion Reactivity, Negative Affect toward Teacher and Negative Engagement with Peers		
Child's Gender	.944	1.059
Mother's Education	.725	1.379
Family Income	.748	1.337
Avoidant Attachment	.978	1.023
Ambivalent Attachment	.927	1.078
Disorganized Attachment	.922	1.085
Chile's Effortful Control	.823	1.215
Conflict in Teacher-child Relationships	.848	1.180
Closeness in Teacher-child Relationships	.902	1.109

Homoscedasticity Assumption: Variance of Residuals



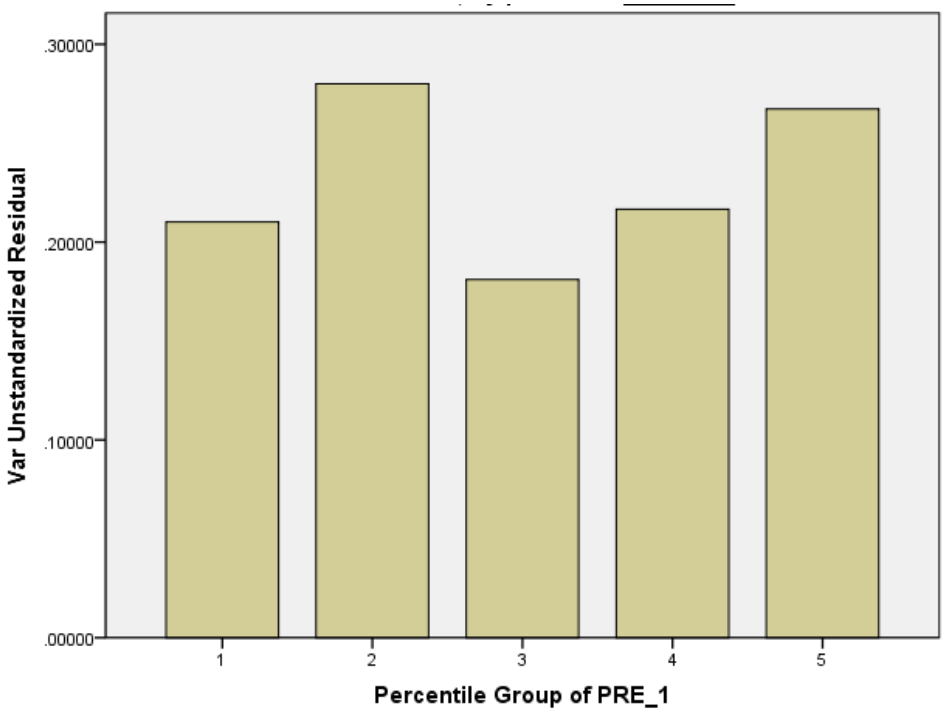
Unstandardized Residual

Percentile Group of PRE_1	Mean	N	Std. Deviation	Variance
1	-.0367828	138	4.29823845	18.475
2	.0041775	139	4.36943824	19.092
3	-.1967490	140	3.29654838	10.867
4	.2610645	138	3.59460413	12.921
5	-.0286812	139	2.98637983	8.918
Total	.0000000	694	3.73980049	13.986



Unstandardized Residual

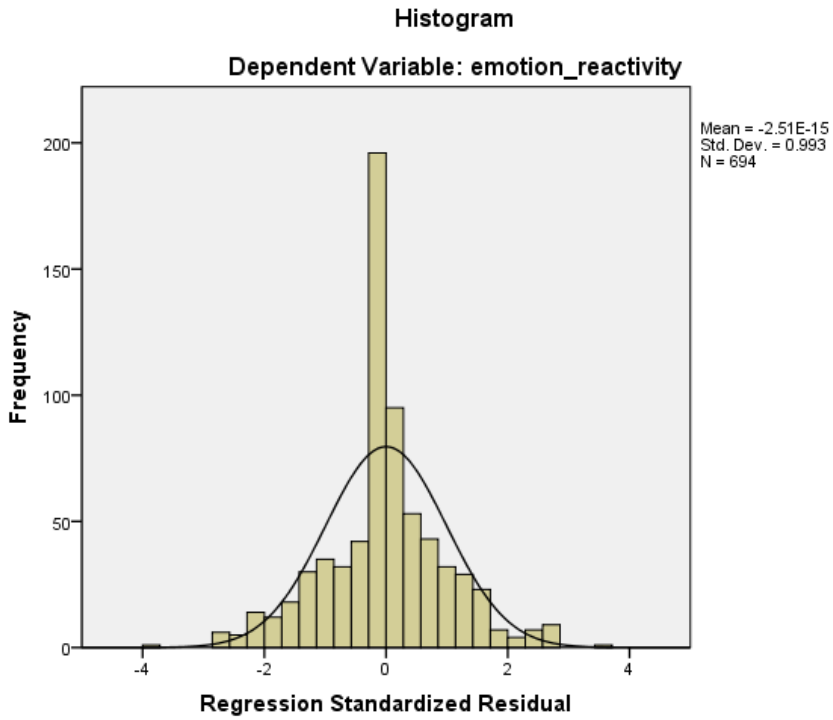
Percentile Group of PRE_1	Mean	N	Std. Deviation	Variance
1	.0034470	138	.09260289	.009
2	.0158326	139	.25107389	.063
3	-.0184019	139	.10944252	.012
4	-.0035314	139	.17813886	.032
5	.0026785	139	.31684163	.100
Total	.0000000	694	.20752830	.043

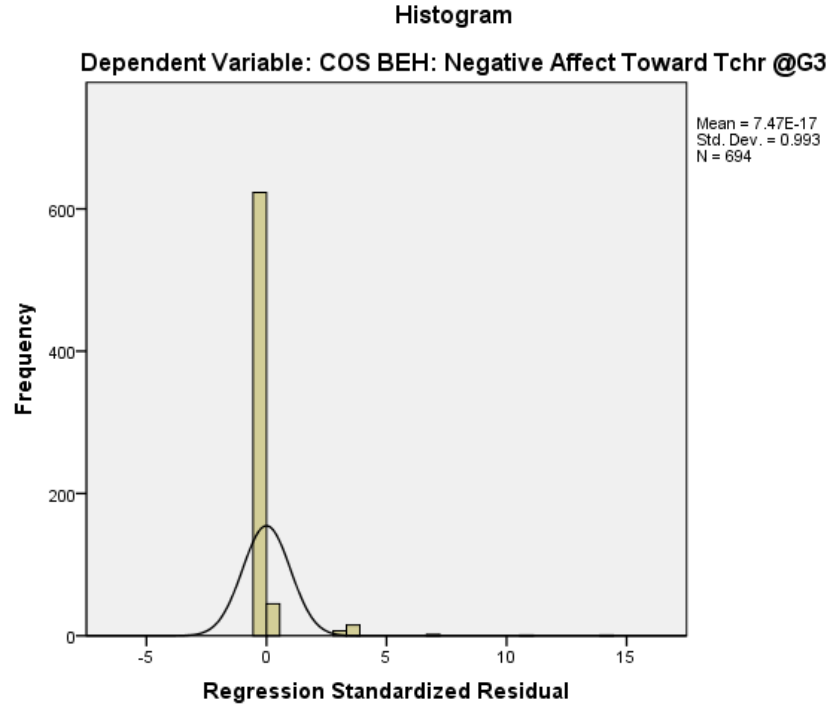


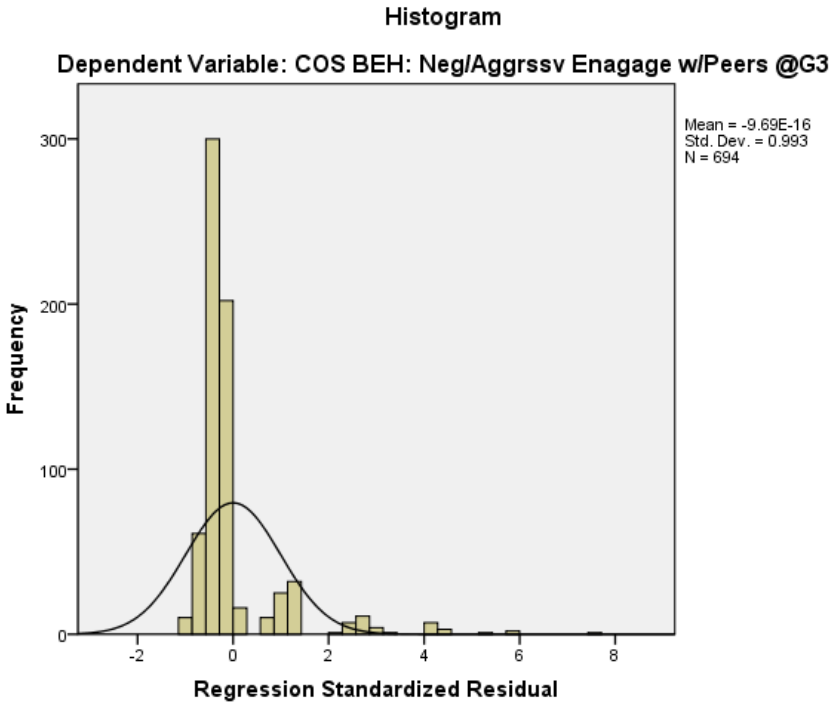
Unstandardized Residual

Percentile Group of PRE_1	Mean	N	Std. Deviation	Variance
1	-.0138200	137	.45848729	.210
2	.0495690	140	.52913409	.280
3	-.0528325	139	.42548654	.181
4	.0088030	139	.46546025	.217
5	.0077250	139	.51703375	.267
Total	.0000000	694	.48058357	.231

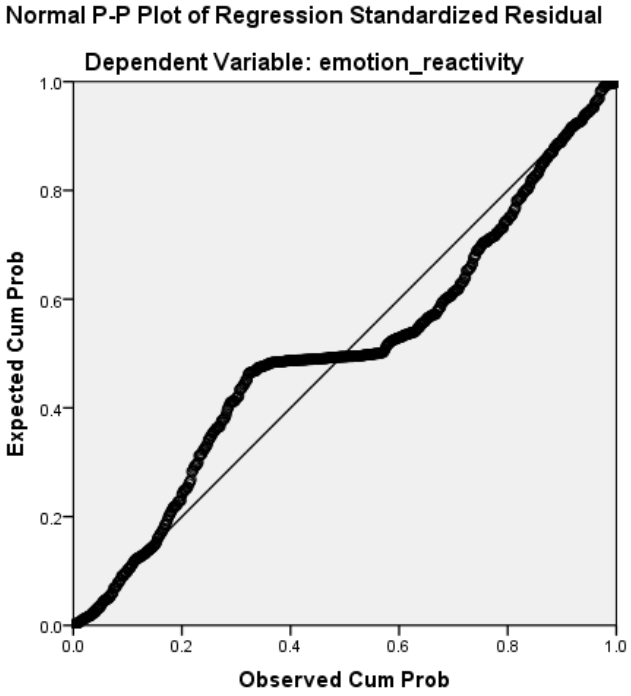
Normality of Residuals Assumption: Histogram

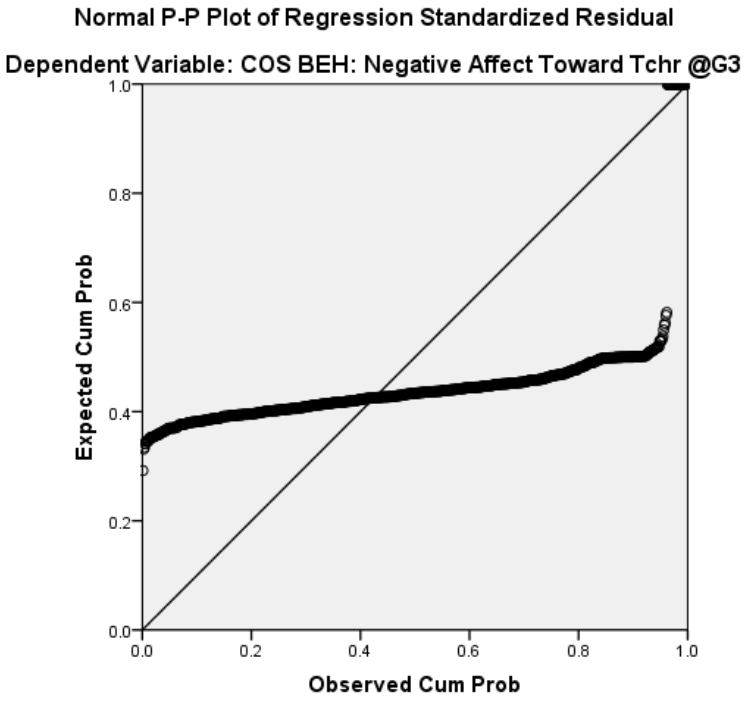


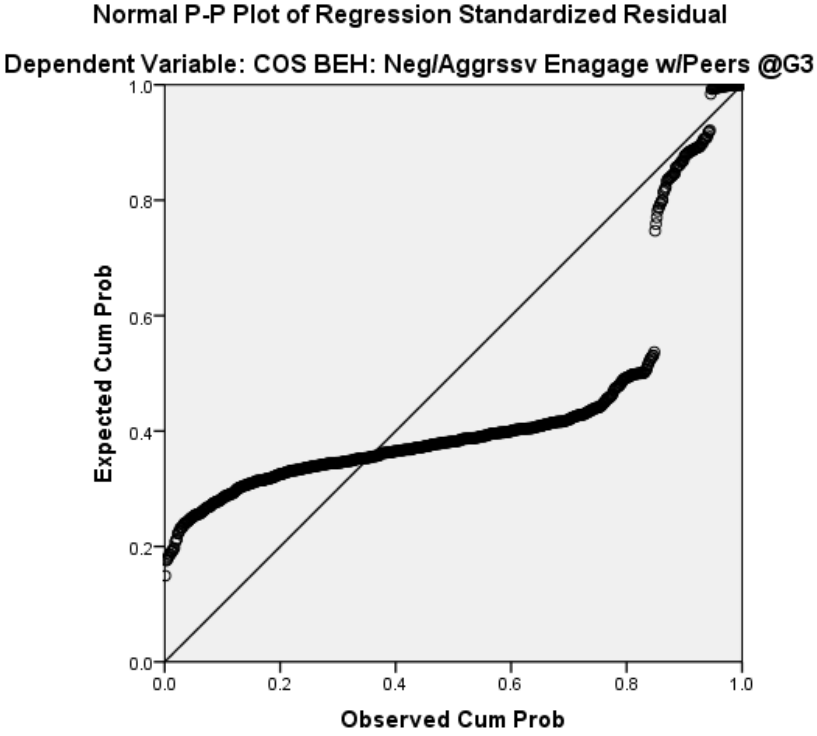




Normality of Residuals Assumption: P-P Plot




Normal P-P Plot of Regression Standardized Residual
Dependent Variable: COS BEH: Negative Affect Toward Tchr @G3
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Normal P-P Plot of Regression Standardized Residual
Dependent Variable: COS BEH: Neg/Aggrssv Enagage w/Peers @G3
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0

APPENDIX E: PATH MODEL DIAGRAMS FOR THE FIVE RESEARCH QUESTIONS

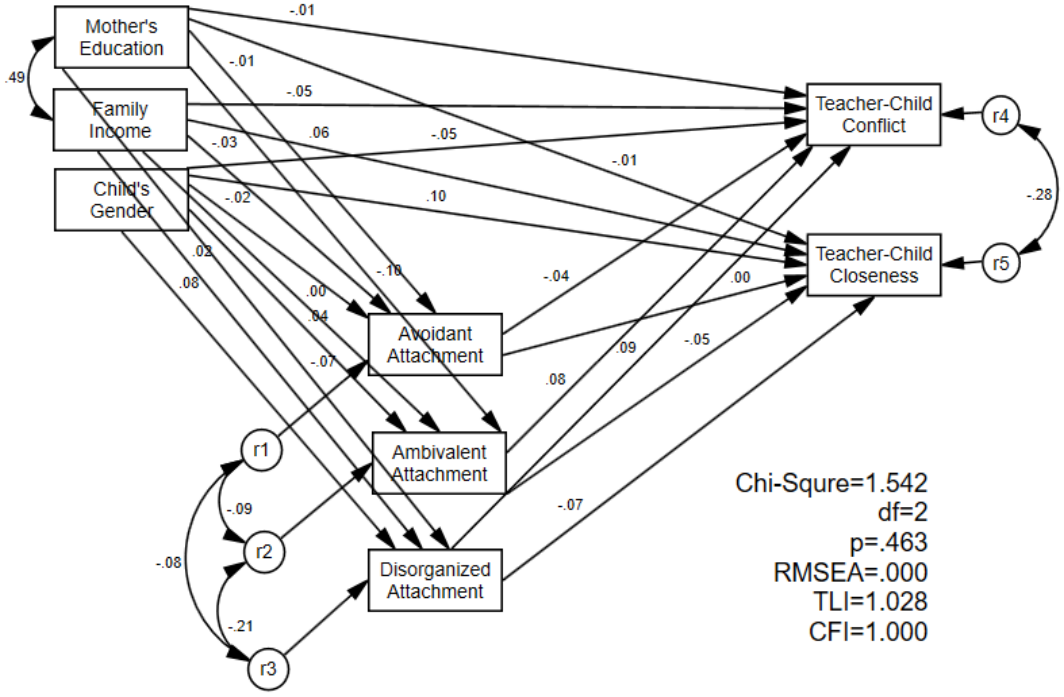


Figure 5. Path model for the research question one.

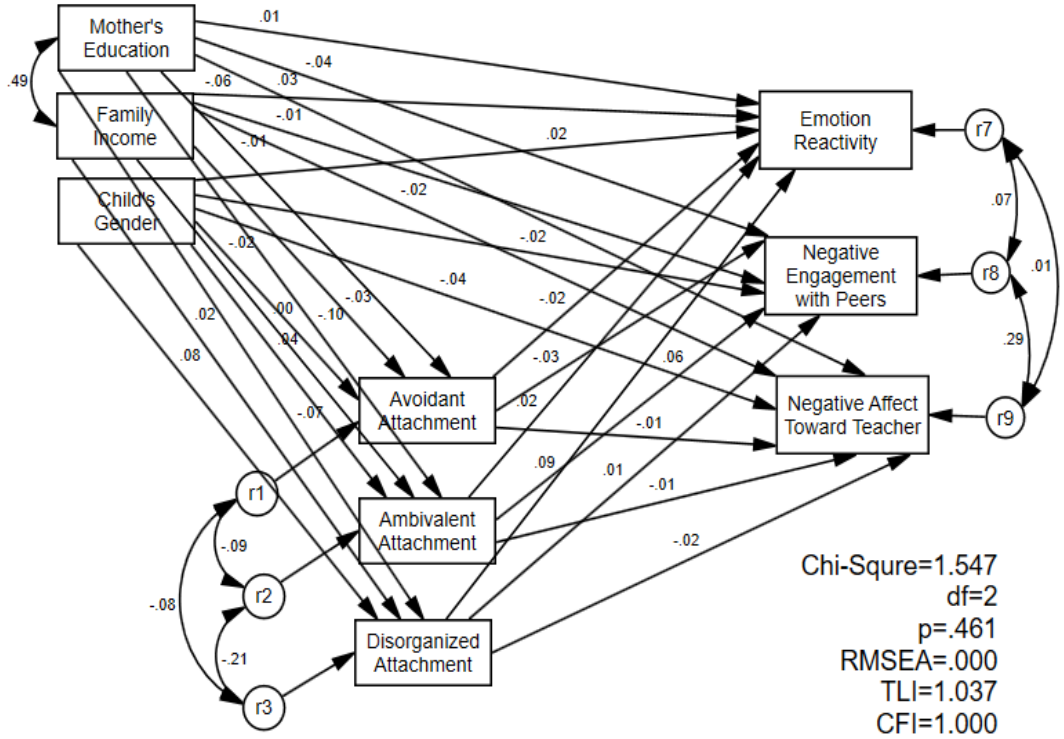


Figure 6. Path model for the research question two.

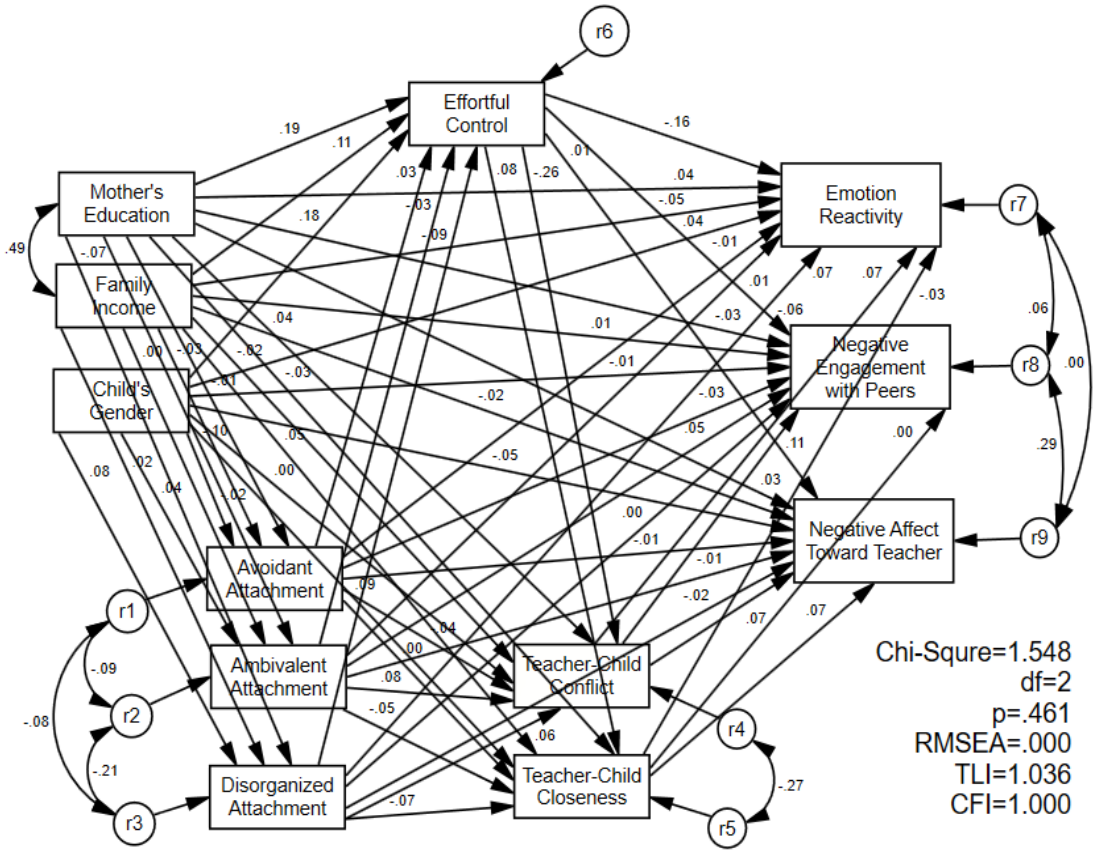


Figure 7. Path model for the research questions three and four.

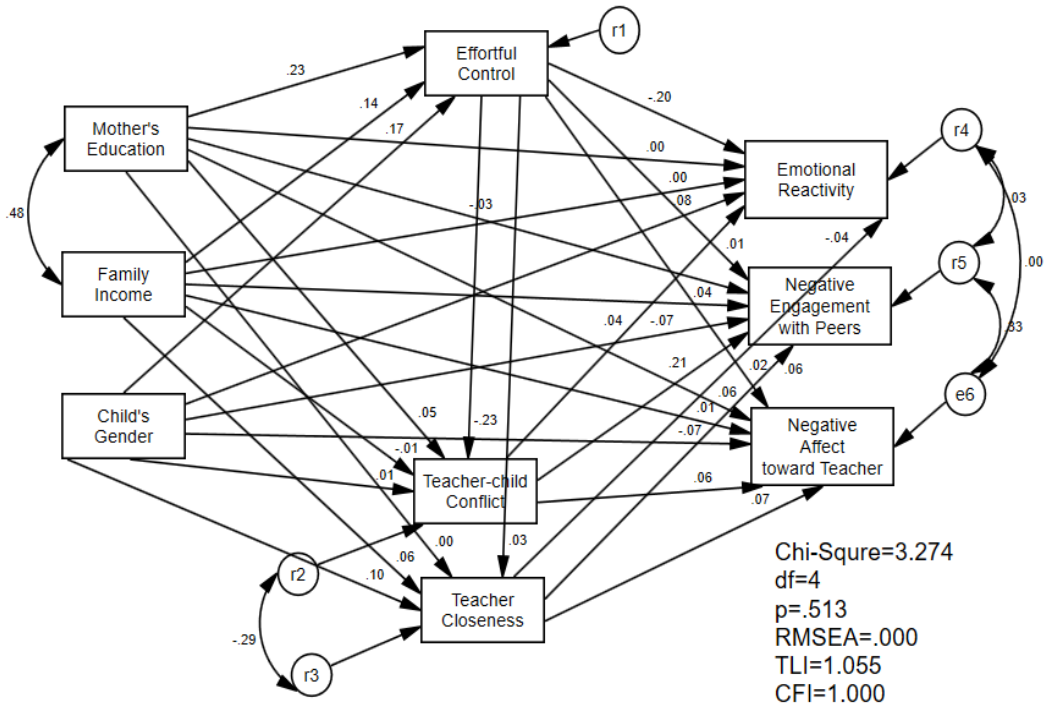


Figure 8. Path model for the research question five A (Secure attachment group).

Note. Mother-child attachment is the multi-group variable, which is not shown in the above model.

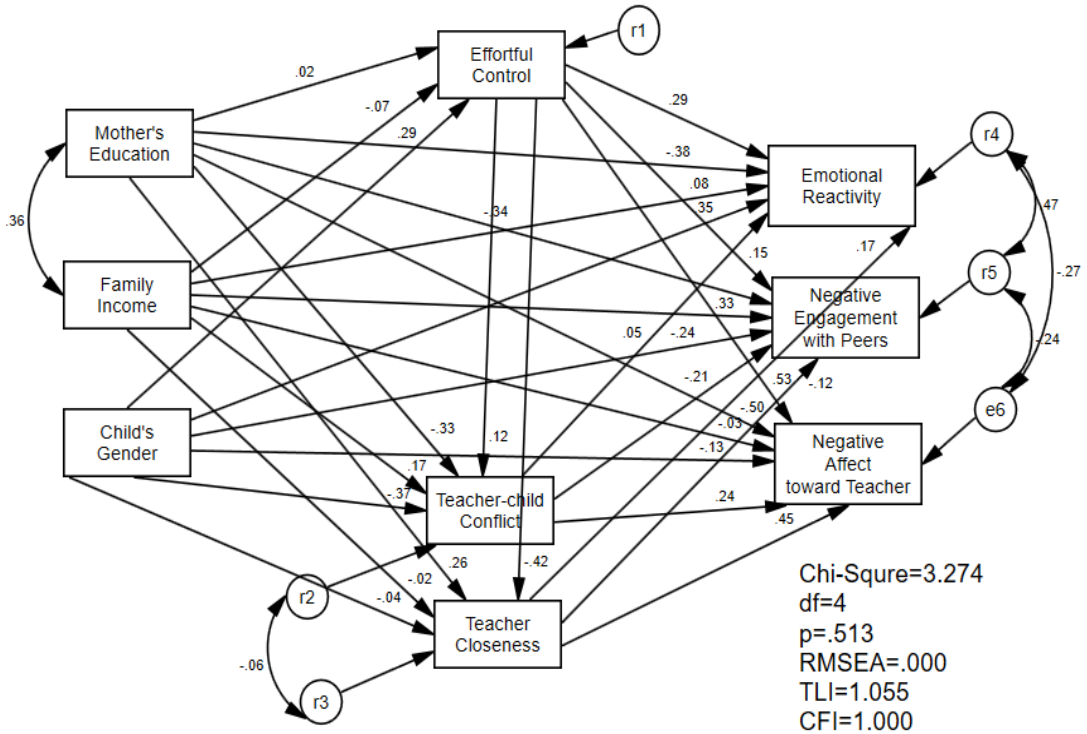


Figure 9. Path model for the research question five A (Avoidant attachment group).
Note. Mother-child attachment is the multi-group variable, which is not shown in the above model.

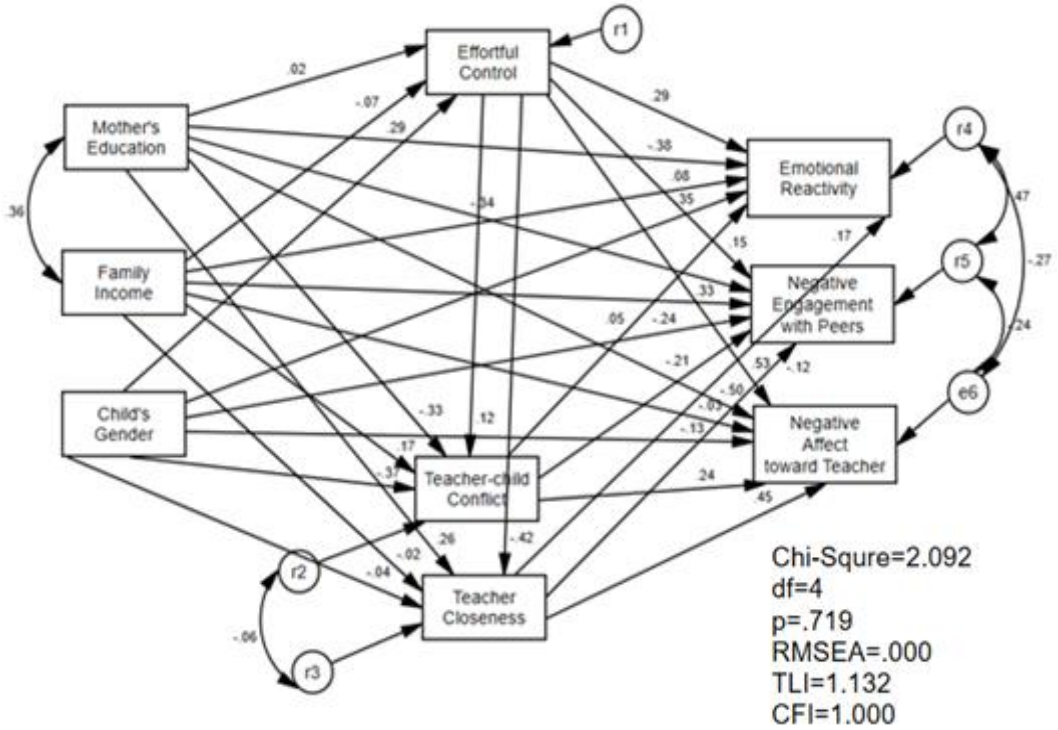


Figure 10. Path model for the research question five B (Secure attachment group).
Note. Mother-child attachment is the multi-group variable, which is not shown in the above model.

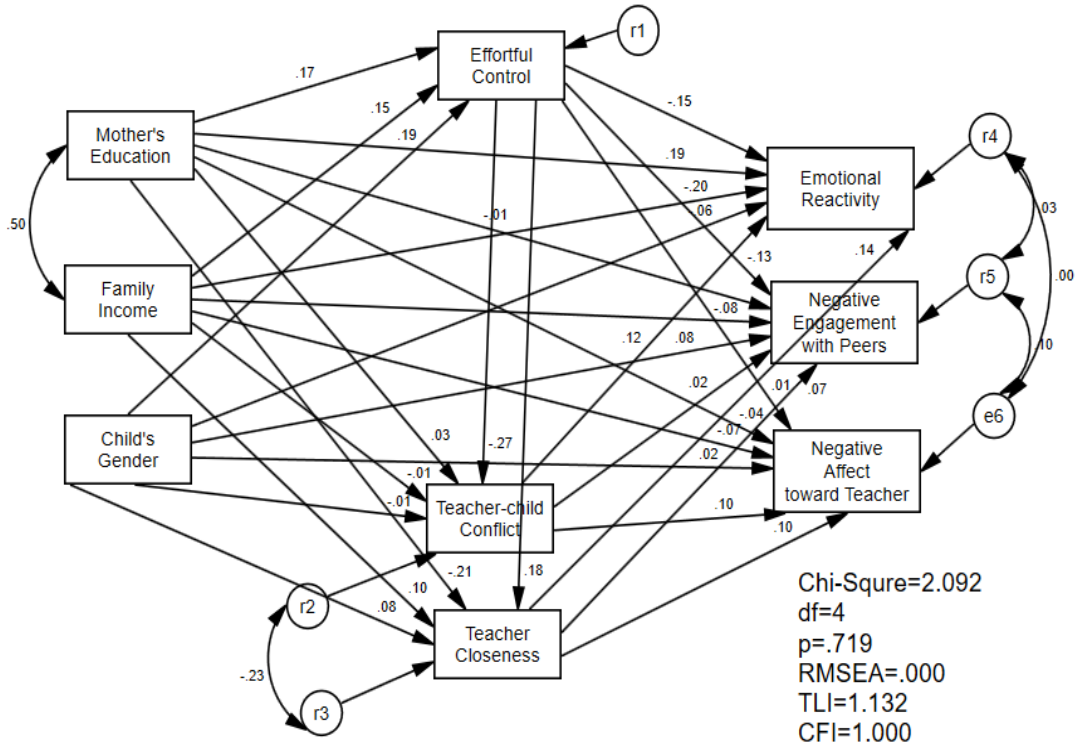


Figure 11. Path model for the research question five B (Ambivalent attachment group).
Note. Mother-child attachment is the multi-group variable, which is not shown in the above model.

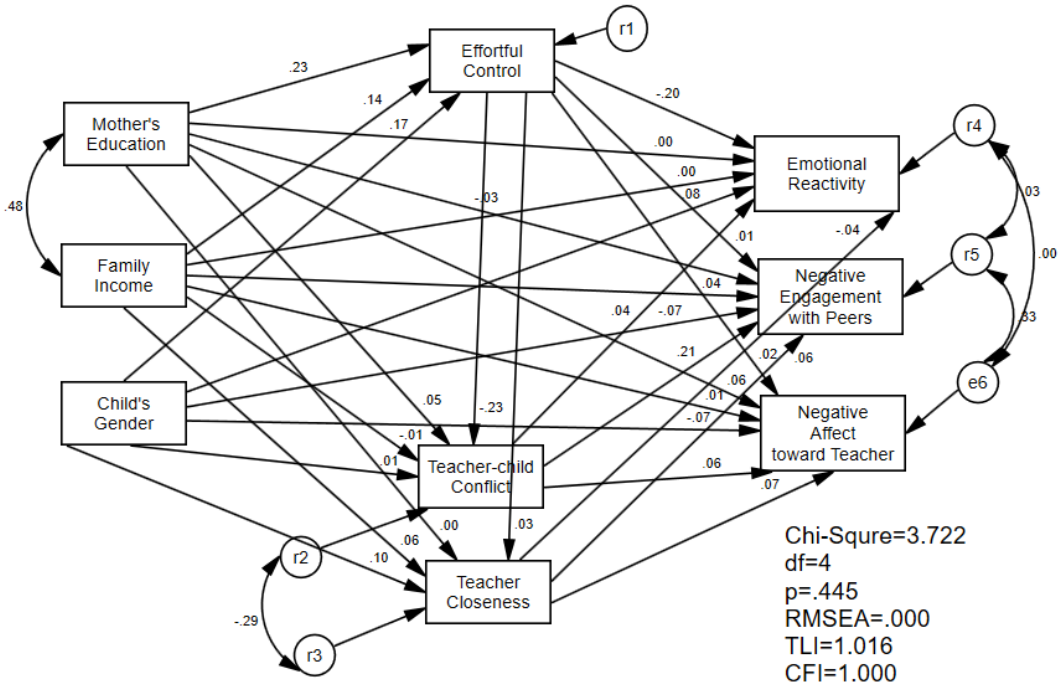


Figure 12. Path model for the research question five C (Secure attachment group).
Note. Mother-child attachment is the multi-group variable, which is not shown in the above model.

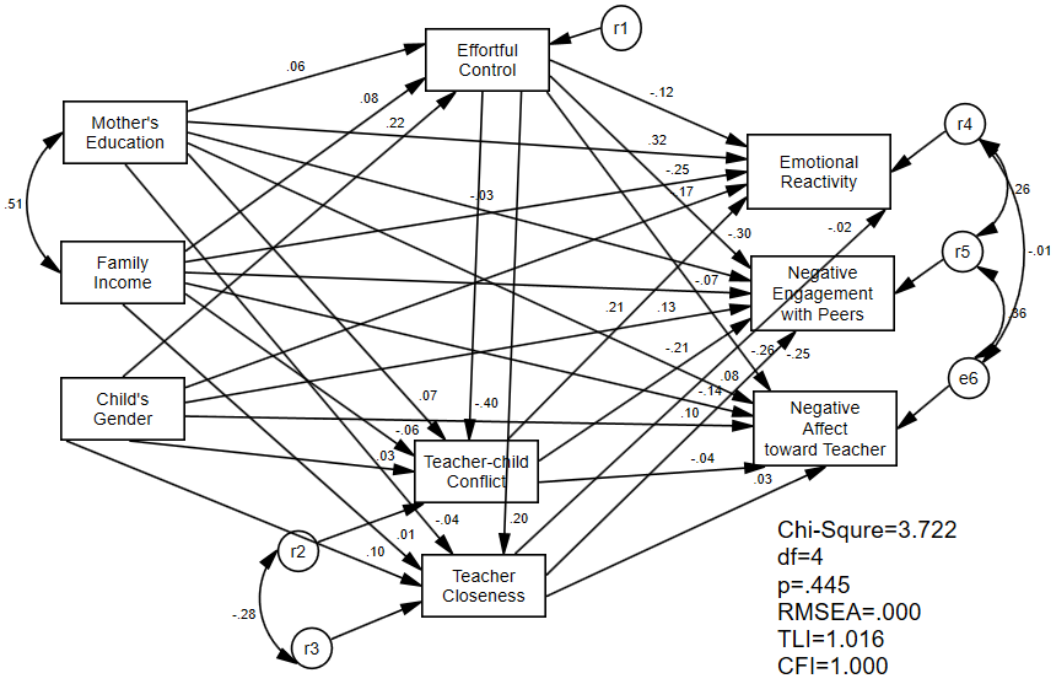


Figure 13. Path model for the research question five C (Disorganized attachment group).

Note. Mother-child attachment is the multi-group variable, which is not shown in the above model.